JUNE 1955

FOUNDRY

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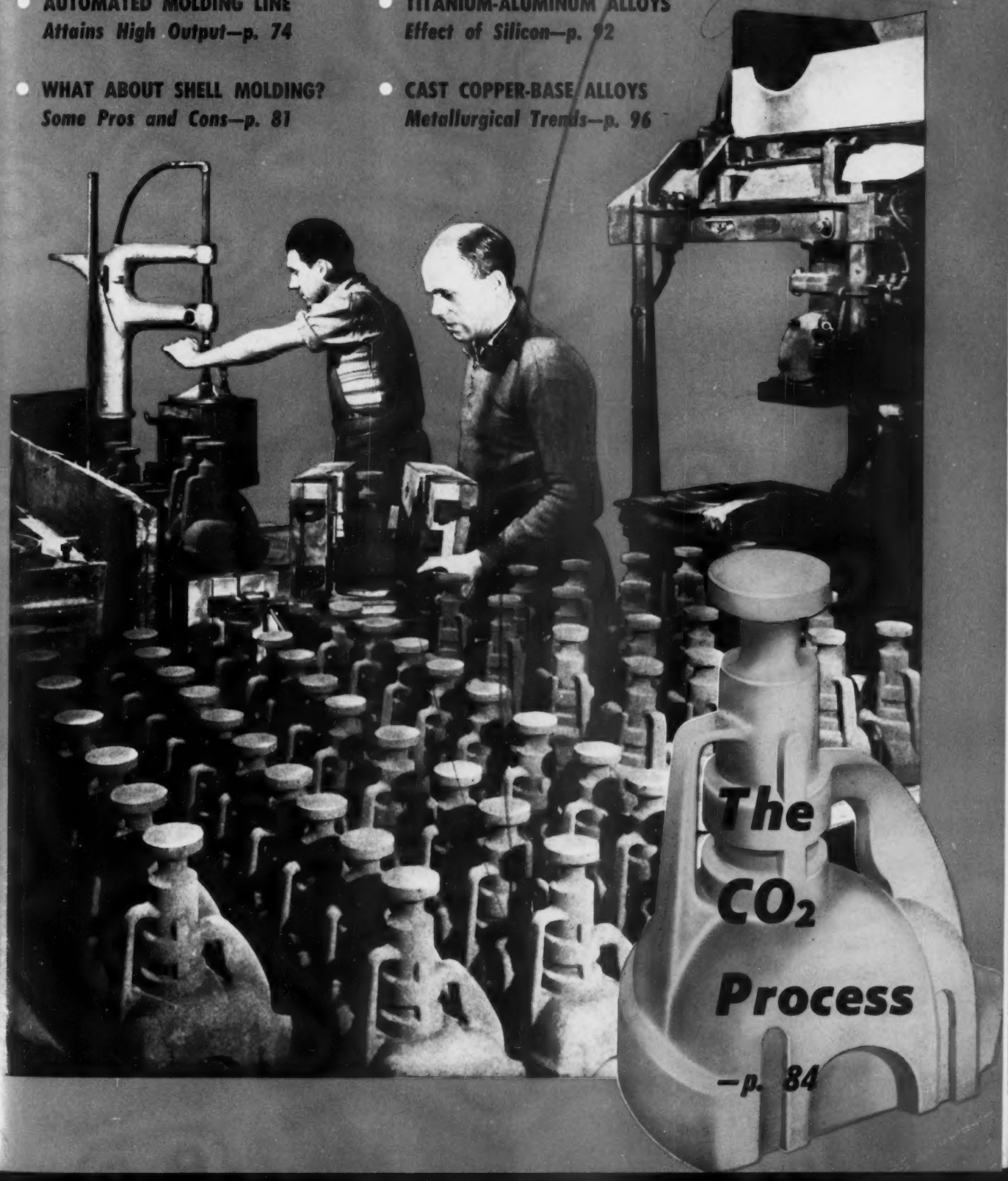

PURITE saves money 8 ways

1. Purite produces higher percentages of finished castings—fewer rejects per ton of metal poured.
2. Purite gives 100% fluxing action in the cupola —100% desulphurizing action in the ladle.
3. Purite is time-tested and proved for rapid and unsurpassed desulphurizing uniformity.
4. Purite permits the use of higher-sulphur raw materials.
5. Purite is 100% pure fused soda ash—you do not pay for inert materials.
6. Purite comes in uniform 2-lb. pigs—no weighing or measuring required.
7. Purite does not crumble—is easy to handle —no waste, no dust.
8. Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada.

MATHIESON

MATHIESON CHEMICALS
OLIN MATHIESON CHEMICAL CORPORATION
INDUSTRIAL CHEMICALS DIVISION · BALTIMORE 3, MD.

Trouble in the foundry

... or how Chuck Wright won a war against bugs

"Last month, Fred Hamlin, metallurgist for Ajax Engine Works, asked me to sit in at a conference.

"Several big wigs from Ajax attended," continued Chuck Wright, the INCO distributor foundry specialist. "The trouble was too many Diesel engine liners and heads from their own foundry, as well as from outside sources, were failing.

"The liner problem was the least serious, because sections were relatively uniform. By making slight adjustments of composition, several producers could meet Ajax specifications.

"But not so with cylinder heads. They had plenty of bugs.

"As you probably know, service stresses, for example, arise not only from gas pressures against a head, but also from wide temperature differences between surfaces exposed to combustion and those cooled by water jackets inside the head. Also, possibly some stresses remain after machining. Or due to faulty anneal. Invariably, stresses combine and move to the weakest point of the design. It's there that castings crack. Not necessarily where stresses originate.

"Of course, I knew that prior to 1950, Ajax specified 1.25-1.50% nickel for heads, and 1-1.25% for liners. Results? Excellent! Since 1950, however, in spite of advances in foundry technique, failures from accumulated stresses continued to trouble them.

"So when Fred stood up and asked for my opinion, I reminded the group of Ajax's past experience. Heavy up the walls, if possible but also add a little nickel for strength and uniform structure in both light and heavy sections. Also, for uniform hardness. Nickel promotes pressure tightness, too. And in cylinder heads it suppresses leakers. And insist, I warned them, on Type A – well distributed and uniformly small graphite . . . to keep mechanical and wearing properties on the favorable side.

"After that conference, Ajax *did* reinstate the nickel cast iron.

"Rejections are now down because the bugs are out. It's as simple as that.

"It's simple to reach me when *your* problem involves the metallurgy of castings. The easiest way is to drop me a line in care of INCO."

INCO TRADE MARK

Chuck Wright

The International Nickel Company, Inc.
67 Wall Street New York 5, N.Y.

HERE'S ALL YOU NEED

If it's easier, better sand control you're after—here's the answer! These three materials, added in varying amounts to sand (dry or in slurry), will give you *close control* over green and dry strength and carbon content, and also provide GREATER FLOWABILITY and LESS LUMPY SHAKEOUT!

GREEN BOND Bentonite excels in developing and controlling green and dry strength. Its medium to low viscosity cuts down on mulling time and permits slurry users to add more bentonite per gallon of slurry, without strain on the pumping system. CROWN HILL Seacoal is exceptionally low in sulphur content, which means your castings will have more easily machined surfaces. Federal SAND STABILIZER improves the flowability of sand and eliminates lumps in sand shakeout. It burns out faster than any other facing material. Since it has a very low ash content and has no deteriorating effect on sand, you can re-use your molding sand *safely*.

And this is important—these advantages, plus many others, are yours at low cost. For these sand additives will actually cost you *less than $1.00 per ton of castings produced!* To learn more about them, write for your copy of *"Tailor-Made Molding Sands"*.

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The **FEDERAL FOUNDRY SUPPLY** *Company*

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FOUNDRY

A PENTON PUBLICATION

June 1955

Volume 83—Number 6

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Tonic for Casting Ailments...

Troubles vanish when you put ADM foundry products to work in your foundry.
You improve casting quality, reduce core-room costs and foundry rejects.

It pays to see your LINOIL man at least twice a year for diagnosis of core problems.

FOR HEALTHY CASTINGS...PRESCRIBE ADM PRODUCTS...

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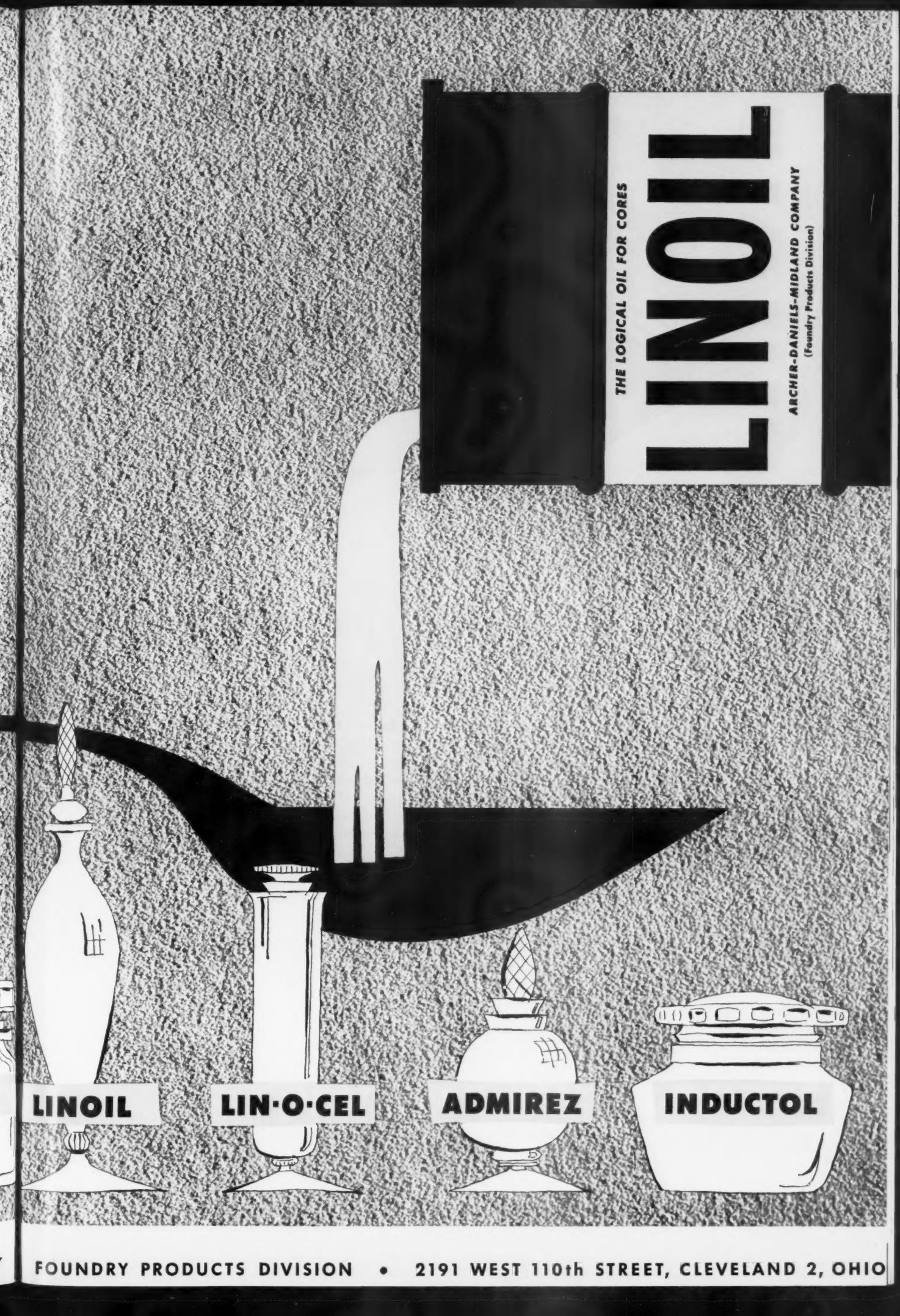
THE LOGICAL OIL FOR CORES
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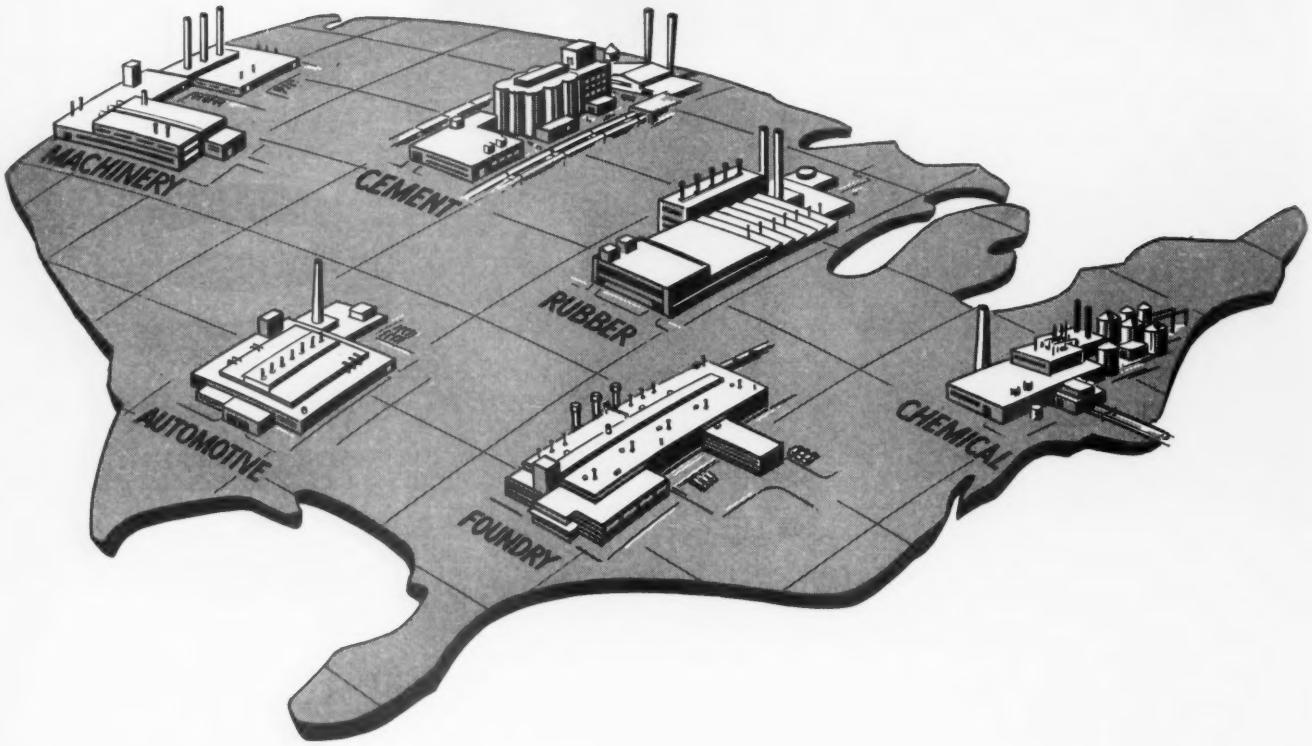

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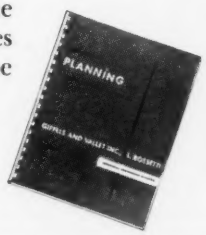
Manufacturers, large and small—in all fields of industry, are turning to professional engineering for better manufacturing methods, better processing facilities, and to increase output and lower production costs. For more than thirty years Giffels & Vallet Inc. has provided a comprehensive planning and engineering service to a widely diversified group of industries. This flexible service can be used to plan and engineer a complete industrial installation, or to supplement and work in cooperation with the client's engineering department.

Whether it's a complete new plant, or the modernization of present facilities – automated machinery, materials handling equipment, equipment design, or process development—Giffels & Vallet Inc. offers a complete professional service to meet the specific requirements of each individual client. These services are set forth in a special Planning Brochure. A copy will be mailed on request.



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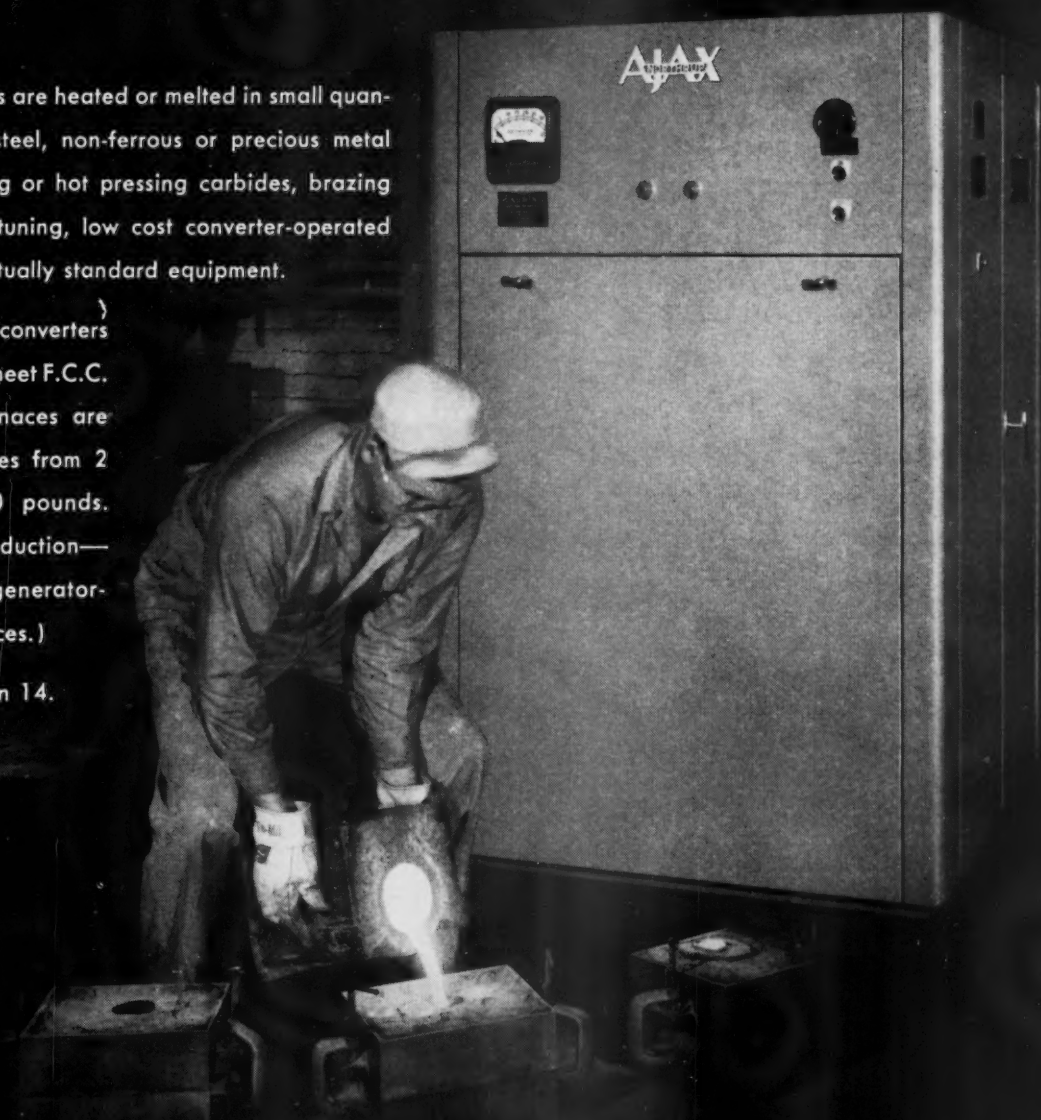
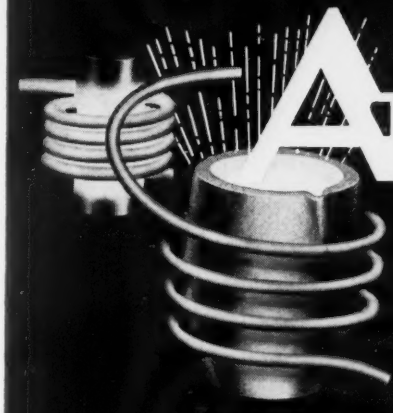
with converter-operated furnaces . . .

Wherever metals are heated or melted in small quantities . . . for steel, non-ferrous or precious metal casting, sintering or hot pressing carbides, brazing . . . these self-tuning, low cost converter-operated furnaces are virtually standard equipment.

Ajax-Northrup converters are certified to meet F.C.C. regulations. Furnaces are available in sizes from 2 ounces to 120 pounds. (For large production—Ajax-Northrup generator-operated furnaces.)

Write for Bulletin 14.





AJAX NORTHRUP SINCE 1916

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AJAX ELECTROTHERMIC CORPORATION • TRENTON 5, NEW JERSEY

Associated Companies: Ajax Electric Company—Ajax Electric Furnace Co.—Ajax Engineering Corp.

SITUATION UNDER CONTROL BY KEOKUK

CHIEF KEOKUK:

"Ugh! Heap smart little chief. I say, Rub sticks to start fire. Him rub MATCH sticks!"

PRINCESS WENATCHEE:

"Yes, Junior has everything under control!"

KEOKUK K ELECTRO-METALS COMPANY

KEOKUK, IOWA

WENATCHEE DIVISION, WENATCHEE, WASHINGTON

Keokuk Silvery . . . the *superior* form of silicon introduction for steel plants and foundries . . . available in 60 and 30 lb. pigs and 12½ lb. piglets . . . in regular or alloy analysis. Keokuk also manufactures high silicon metal.

There's just no match for Keokuk Silvery Pig Iron to control quality and costs. *Due to its exact, uniform analysis, Keokuk assures less waste resulting in greater economy.* Car for car, pig for pig, its uniformity *never* varies. Charge Keokuk by magnet or count!

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PROFIT PICTURES

Foundry cuts core baking time 85% with electronic oven and **Resimene 970**

Close-up of finished gear case housing made for Maytag washer. Note intricate design, smooth finish and sharp corners obtained with Resimene 970 Core Binder.

Core bonded with Resimene 970 is inspected at receiving end of the electronic oven. Superior resistance of Resimene to moisture eliminates many problems.

MONSANTO UREA RESIN IS HELPING RAISE PRODUCTION 75% AND REDUCE SCRAP TO WITHIN 4%

Under-baked, low-density cores which produce rough, inferior castings have been one of the foundry industry's biggest production headaches.

In the past, foundry men had to "live" with this problem—but it isn't necessary today.

New techniques and materials—such as Monsanto's Resimene 970 urea core binding resin—make it possible to work with quick-baking, high-density cores that eliminate moisture damage, minimize scrap and satisfy the customers' demands for a fine cast finish.

For more than 4 years the Albert Lea Foundry Company (Albert Lea, Minn.) has been using Resimene 970 for precision casting jobs such as parts for the Maytag washing machine.

"The quick-baking qualities of Resimene 970," says R. A. Trow, Vice-President, "have helped us raise our production rate 75% and enabled us to work to an entirely new set of quality standards."

For phenolic or urea foundry resins that are research-developed and shop-tested to meet *your* needs, write first to Monsanto Chemical Company, Plastics Division, Dept. FO6, Springfield 2, Mass.

For stronger, better cores specify

RESIMENE®

MONSANTO

IMPERIAL BELT lasts 4½ years lifting hot shakeout sand

Durability, economy proven at Allegheny Ludlum

The real test of satisfactory belting performance comes when the plant operator orders a replacement for an original belt. When this elevator was installed at the Aliegheny Ludlum Steel Corporation, Buffalo, N. Y., the conveyor company equipped it with an Imperial Standard Sahara (150′ x 12″ x 7 ply). For 4½ years that belt operated 16 hours a day elevating hot shakeout sand.

Its long life with minimum maintenance was an important cost factor in selecting a replacement — another Standard Sahara Belt.

Job-designed for long life

Imperial Sahara Belts are made of heavy-duty hard silver duck, double stitched to positively prevent ply separation. Special impregnation gives protection from the destructive action of sustained high temperatures. Manufactured in three types: Standard Sahara for temperatures to 300° F.; Insulated Sahara, up to 450°; Super Insulated Sahara, up to 600°. Let us make money-saving recommendations on your conveying or elevating jobs.

You expect more from Imperial . . . and you get more

Imperial

BELTING CO.

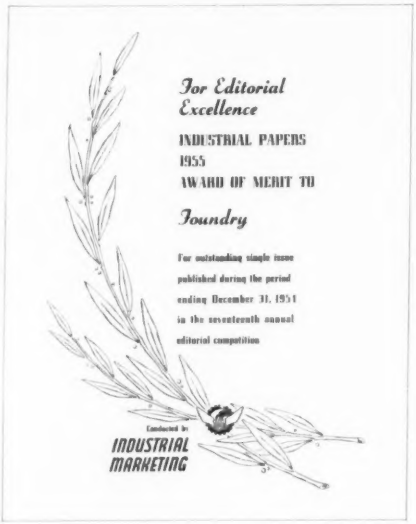
1755 S. Kilbourn Ave., Chicago 23, Ill.

Engineered Belting— The Right Belt for Each Job

With the EDITORS

AWARD OF MERIT: Last November FOUNDRY presented a special report covering the many ramifications of molding sand use. The editors thought the study quite good, and this belief was strengthened by the many letters received from readers telling how the information was of value to them in their work.

So earlier this year the issue was entered in the contest conducted annually by *Industrial Marketing* for editorial excellence in the hundreds of industrial publications. Recently FOUNDRY was notified that the November number had won an award of merit "for outstanding single issue published during the period ending Dec. 31, 1954." The certificate,


For Editorial Excellence
INDUSTRIAL PAPERS
1955
AWARD OF MERIT TO
Foundry
For outstanding single issue published during the period ending December 31, 1954 in the seventeenth annual editorial competition
Conducted by
INDUSTRIAL MARKETING

which is equivalent to a second prize, has been received and hangs in Bill Gude's office.

Full credit for this award should go to the authors of the interesting articles on molding sand which were presented in the winning issue.

The FOUNDRY editors also are pleased that the bronze plaque in that category, equivalent to first prize, was won by our sister publication, *Machine Design*. That publication also won an award of merit for the best single article. *Steel*, another Penton publication, won a bronze plaque for the best series of articles and an award of merit for the best design appearance. Our congratulations to both publications.

—o—

Social Note: A note from G. Lambert, secretary, Institute of British Foundrymen, reads as follows:

"The Council of the Institute of British Foundrymen announces with extreme pleasure that H.R.H. The Duke of Edinburgh has been elected an Honorary Member of the Institute. The election, which is most gratifying to members both in this country and the Commonwealth, took place at a meeting held on January 15th, the Council having been granted permission to make the nomination."

—o—

A Suspicion Grows: The Senate Armed Services Committee appears to be a bit concerned that much of the huge tonnages of scrap metal now being exported from this country is reaching iron curtain countries. A recent news report carried the following note: "Recalling similar deliveries to Japan before World War II, Senator Olin D. Johnston of South Carolina stated, 'Only a fool can make the same mistake twice.'"

In calling attention to the danger in the unrestricted exportation of scrap back in the December, 1953 issue of FOUNDRY, I said editorially, "This nation should not play the part of the sucker for a second time."

Again, in March, 1955, with the exports of scrap increasing, I warned of the consequences, and closed the editorial with the following: "The unlimited exportation of fine scrap in both categories, as now permitted by the Department of Commerce, is nothing short of criminal in the light of our past experience. It should be stopped at once."

Let us hope the Armed Services Committee takes a good look at what is going on under government sanction.

—o—

Publishers: Bill and Arthur Grede, Grede Foundries Inc., Milwaukee, are reported to have purchased the *Wauwatosa News-Times* and *Elm Leaves*, suburban newspapers.

We cannot imagine adding the headaches of operating a newspaper to those of running successful foundries.

Sturdy men these!

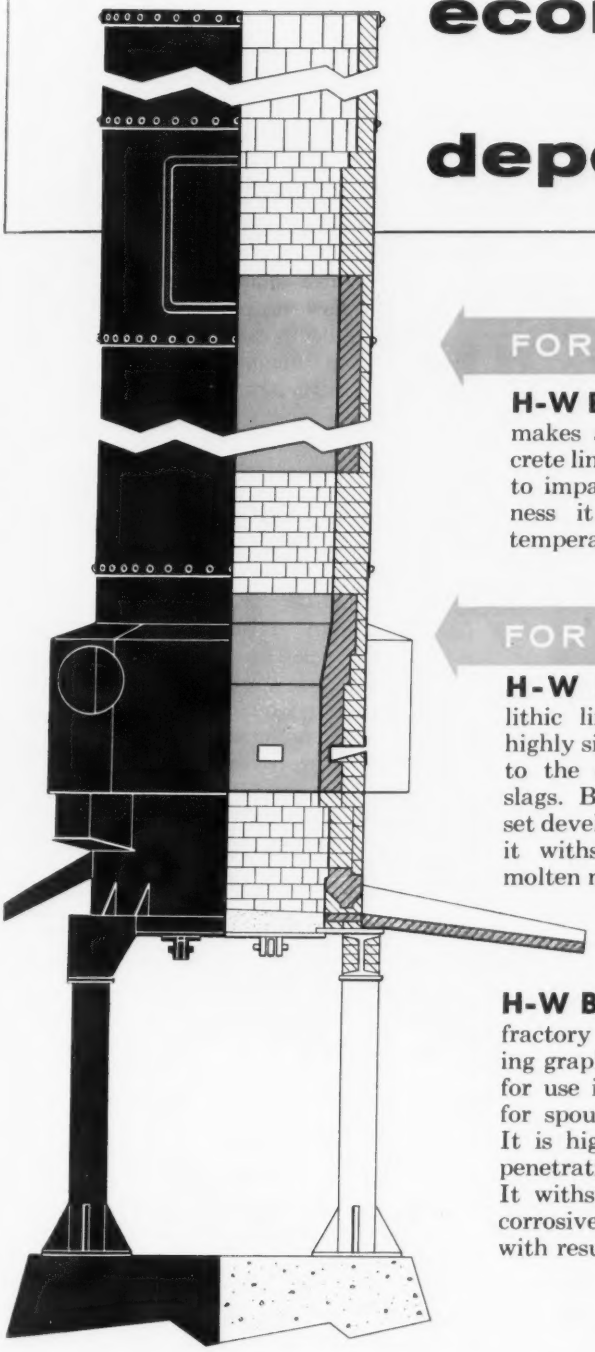
—o—

Malleable and Safety: Malleable founders should be pleased with a recent news story announcing that the Chrysler Corp. would offer safety seat belts as optional equipment in all of its 1955 cars. One newspaper story described the construction in part as follows: Double loops of aircraft-grade galvanized stranded steel cable at each end of the supporting

Harbison-Walker *Monolithic* cupola linings

economical to install and maintain...

dependable in service...



FOR THE CHARGING ZONE

H-W Extra Strength Castable makes a hard, strong refractory concrete lining which is extremely resistant to impact and abrasion. In refractoriness it is adequate for service at temperatures up to 2400°F.

FOR THE MELTING ZONE

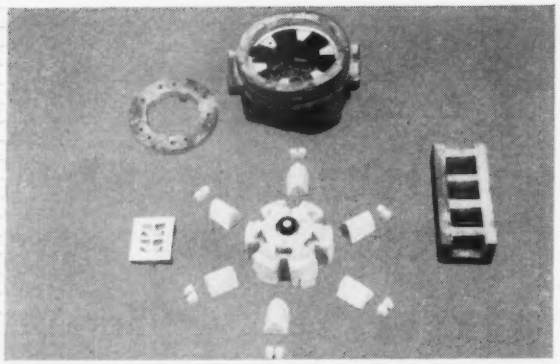
H-W Kuplomix provides monolithic linings free from joints. It is highly siliceous and extremely resistant to the corrosive action of non-basic slags. Because of the strong ceramic set developed at working temperatures, it withstands the erosive action of molten metal and slag to a high degree.

FOR THE BOTTOM ZONE

H-W Black Patch is a plastic refractory of super-duty quality containing graphite, which is especially suited for use in the cupola breast wall and for spouts, runners and ladle linings. It is highly resistant to wetting and penetration by molten iron and slags. It withstands the severe erosive and corrosive action of metals and slags with resultant longer service life.

In addition to the above, Harbison-Walker products include all classes of commercial refractories for every foundry requirement.

HARBISON-WALKER REFRACTORIES CO.
AND SUBSIDIARIES
World's Largest Producer of Refractories
GENERAL OFFICES: PITTSBURGH 22, PENNA.



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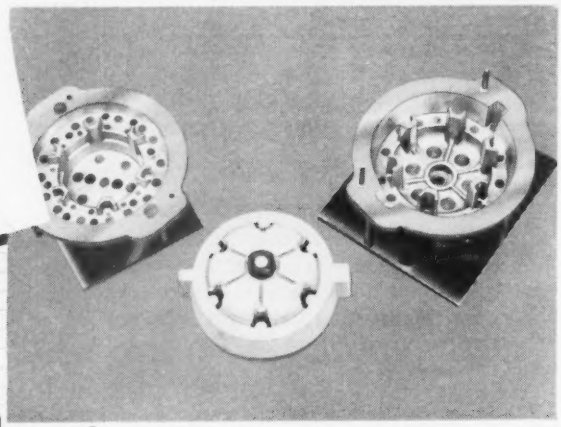


Well-Made PATTERN

This may be simple arithmetic but it didn't seem so to one of our customers. When he brought this job to us, it required thirteen cores.

Our pattern engineers suggested a design change in the casting which eliminated six cores. The remaining seven cores were then easily combined, substituting one pattern and one core for the original thirteen.

The result was an immediate production increase and cost reduction by eliminating extra work in the core room, tedious fitting on the molding floor and excessive flashing removal after the casting was made.

An unusual case? Not particularly. Because of our long experience in the pattern business as well as the foundry business, our pattern engineers look at every job with a practical eye. Our patterns are Well-Made not only to meet blue print specifications, but also to function efficiently when translated into sand and hot metal on the mold floor.

For complete information write for Catalog 53.

Well-Cast MAGNESIUM, ALUMINUM AND BRONZE CASTINGS

Well-Made WOOD AND METAL PATTERNS

THE WELLMAN BRONZE & ALUMINUM CO.

Dept. 7, 12800 Shaker Boulevard Cleveland 20, Ohio

beam run down through the floor panel and are secured to the car's frame with malleable iron brackets to prevent them from 'creeping' along the frame."

Perhaps the malleable group has a new slogan: "For safety—use malleable iron castings."

—o—

Our Problems Are Emphasized: Foundry accidents recently provided front page headlines in two metropolitan newspapers. The Mar. 25 issue of the *Milwaukee Journal* carried a two-line, five-column head "34 Men Burned at Nordberg in Explosion of Molten Metal." The story told how a mold "blew" while being filled, showering molten metal over a number of workers. The most seriously burned workman died a week later.

On Mar. 29, the *Cleveland News* carried a streamer "Fumes Fell 52 in Foundry." The story presented the theory that carbon monoxide fumes exhausted from the cupolas had been blown back into the plant through skylights by a freak or sudden shift of the wind. No fatalities were reported.

As with every other company, group or industry, the service provided our civilization by foundries seldom receives any mention in the newspapers. But the difficulties that may be encountered from time to time are played up in the front page headlines.

—o—

Congratulations: I understand that sometime during the month, Dr. Guilliam H. Clamer, president, Ajax Electro Metallurgical Corp., Philadelphia, and associated companies, will celebrate his 80th birthday. Congratulations to this very fine gentleman who has contributed so much over so many years to progress of the foundry industry.

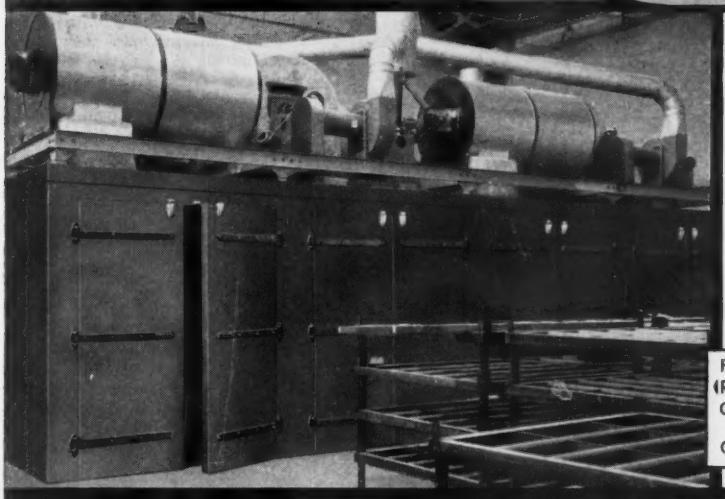
Dr. Clamer has contributed through his companies in the fields of nonferrous metals and melting. He has been active in the affairs of ASTM, the AIME, the AFS and other organizations and has prepared many papers for societies and articles for the technical press. He is a past president of the AFS, and in 1933 was awarded the Joseph S. Seaman gold medal of the society for his outstanding achievements in the castings industry.

The first time I met Dr. Clamer, well over 30 years ago, he was very kind and considerate, and he has been most helpful to the FOUNDRY staff since.

Thanks so much Doctor, and may you celebrate many more birthdays.

F.G.S.

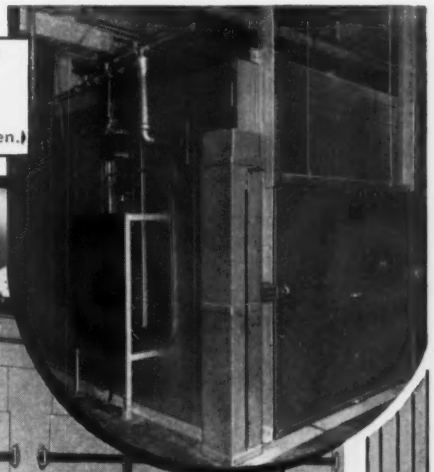
Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO



The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

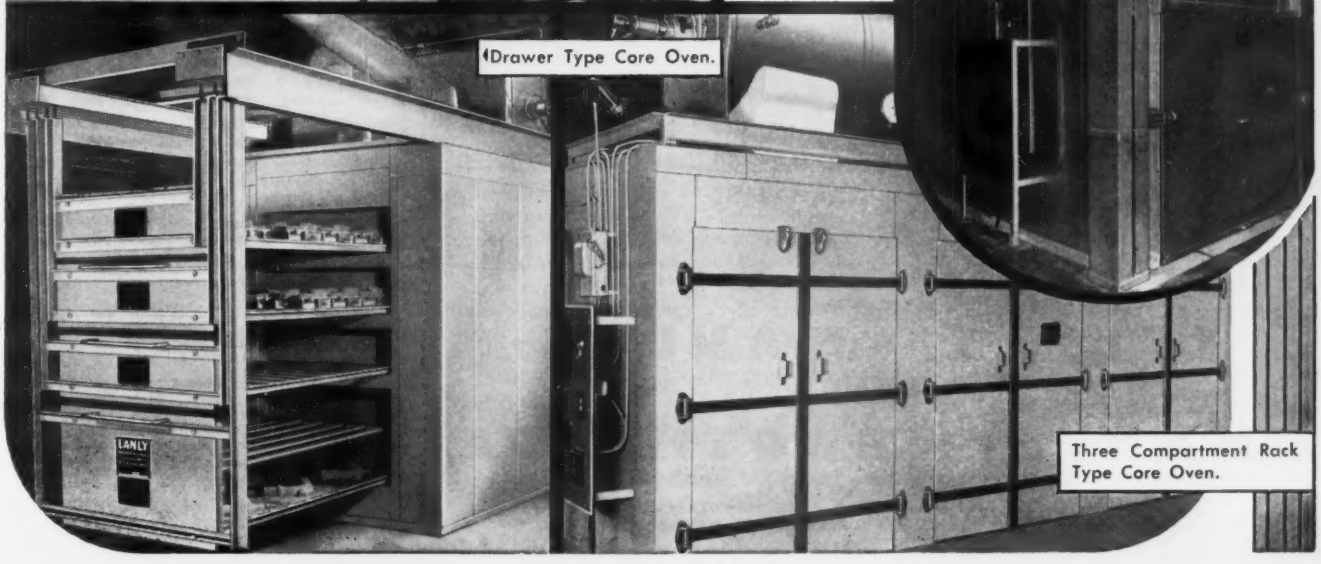
Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.



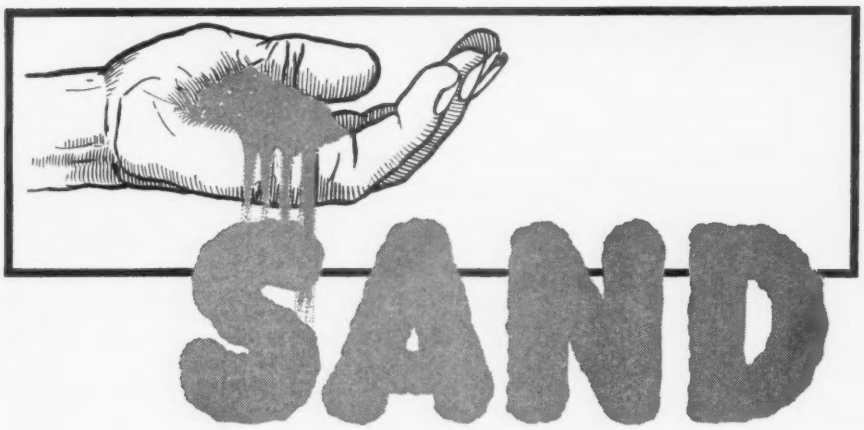
Four Compartment Rack Type Core Oven.

Car Type Core Oven.



Drawer Type Core Oven.

Three Compartment Rack Type Core Oven.



SAND

PRODUCERS OF:

MANKO DRIED & SCREENED SILICA SAND:
Grain Fineness 50-75

MANKO SILICA FLOUR:
Foundry Grade—140 Mesh

MB DRIED & SCREENED LAKE SAND:
Grain Fineness 48-52

MICHIGAN CITY DRIED & SCREENED LAKE SAND:
Grain Fineness 53-55

MICHIANA DRIED & SCREENED LAKE SAND:
Grain Fineness Approx. 70

HIGH DENSITY BLENDED DRIED & SCREENED LAKE SANDS:
Grain Fineness 55-65

LIME FREE SAWYER SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

GARY SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

MICHIGAN CITY SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

DUNE PARK SCREENED LAKE SAND:
Pit Moisture—Open or Closed Cars

MICHIANA SCREENED BANK SAND:
Grain Fineness Approx. 70
—Open or Closed Cars

WABASH SCREENED BANK SAND:
Grain Fineness 80-100—Pit moisture—Open or Closed Cars

DISTRIBUTORS OF:

RED CEDAR DRIED, MILLED & SCREENED MOLDING SAND:
Tennessee—Approx. Permeability Range 190-470

CYPRESS DRIED, MILLED & SCREENED MOLDING SAND:
Tennessee—Approx. Permeability Range 7-160

MAPLE DRIED, MILLED & SCREENED MOLDING SAND:
Indiana—Approx. Permeability Range 4-70

PANTHER CREEK SOUTHERN BENTONITE

SWEDEN DRIED, MILLED & SCREENED MOLDING SAND:
Indiana—Approx. Permeability Range—80-100

VOLCLAY WESTERN BENTONITE

KIOWA DRIED & SCREENED SILICA SAND:
Grain Fineness—35-90

KIOWA 100 DRIED & SCREENED SILICA SAND:
Shell Molding—D Process
—Velvet Finish Cores

LYLE T. MANLEY COMPANY

MANLEY BROTHERS INCORPORATED

Offices: Chicago District, 1050 OGDEN DUNES, GARY, IND.; ROCKTON, ILL.
Telephones: ROCKTON 2-4221, 2-5581, 2-8511; OGDEN DUNES 2925, 3820

CALENDAR of Meetings

June 7-10—American Welding Society, national spring meeting and exposition, Municipal Auditorium, Kansas City, Mo.

June 16-18—Malleable Founders' Society, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

June 26-28—Alloy Casting Institute, annual meeting, The Homestead, Hot Springs, Va.

June 26-July 1—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

July 12-14—Western Plant Maintenance Show, Pan-Pacific Auditorium, Los Angeles.

Sept. 6-17—National Machine Tool Builders Association, machine tool show, International Amphitheater, Chicago.

Sept. 6-17—Coliseum Machinery Show, Chicago Coliseum, Chicago.

Sept. 6-17—Production Engineering Show, Navy Pier, Chicago.

Sept. 12-16—Instrument Society of America, instrument conference and exhibit, Shrine Exposition Hall and Auditorium, Los Angeles.

Sept. 29-30—Missouri Valley Regional Foundry Conference, sponsored by St. Louis, Tri-State, and Mo-Kan Chapters of AFS and Missouri School of Mines Student Chapter, at Missouri School of Mines and Metallurgy, Rolla, Mo.

Oct. 6-7—National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago.

Oct. 13-15—Committee on Vacuum Techniques Inc., symposium on vacuum technology, Mellon Institute, Pittsburgh.

Oct. 13-15—Foundry Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 14-16—Northwest Regional Foundry Conference, Portland, Oreg.

Oct. 16-18—Conveyor Equipment Manufacturers Association, annual meeting, The Greenbrier, White Sulhpur Springs, W. Va.

Oct. 17-18—American Coke & Coal Chemicals Institute, annual meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-21—American Society for Metals, national metal exposition and congress, Convention Hall, Philadelphia.

Oct. 18—American Society of Safety Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

Oct. 19-21—Gray Iron Founders' Society, annual meeting, Schroeder Hotel, Milwaukee.

Oct. 20-21—Ohio Regional Foundry Conference, sponsored by Ohio AFS chapters, Case Institute of Technology, Cleveland.

Oct. 24-25—Steel Founders' Society of America, fall meeting, The Greenbrier, White Sulphur Springs, W. Va.

Oct. 24-29—Foremen's Club of Montreal, Canadian industrial tool and equipment show, Show Mart Bldg., Montreal.

Oct. 31-Nov. 1—Magnesium Association, annual meeting, Biltmore Hotel, New York.

Nov. 1-3—Grinding Wheel Institute and Abrasive Grain Association, fall meeting, Statler Hotel, Buffalo.

Nov. 3-4—Metals Casting Conference, Purdue University, Lafayette, Ind.

Nov. 14-16—National Metal Trades Association, annual convention, Hotel Commodore, New York.

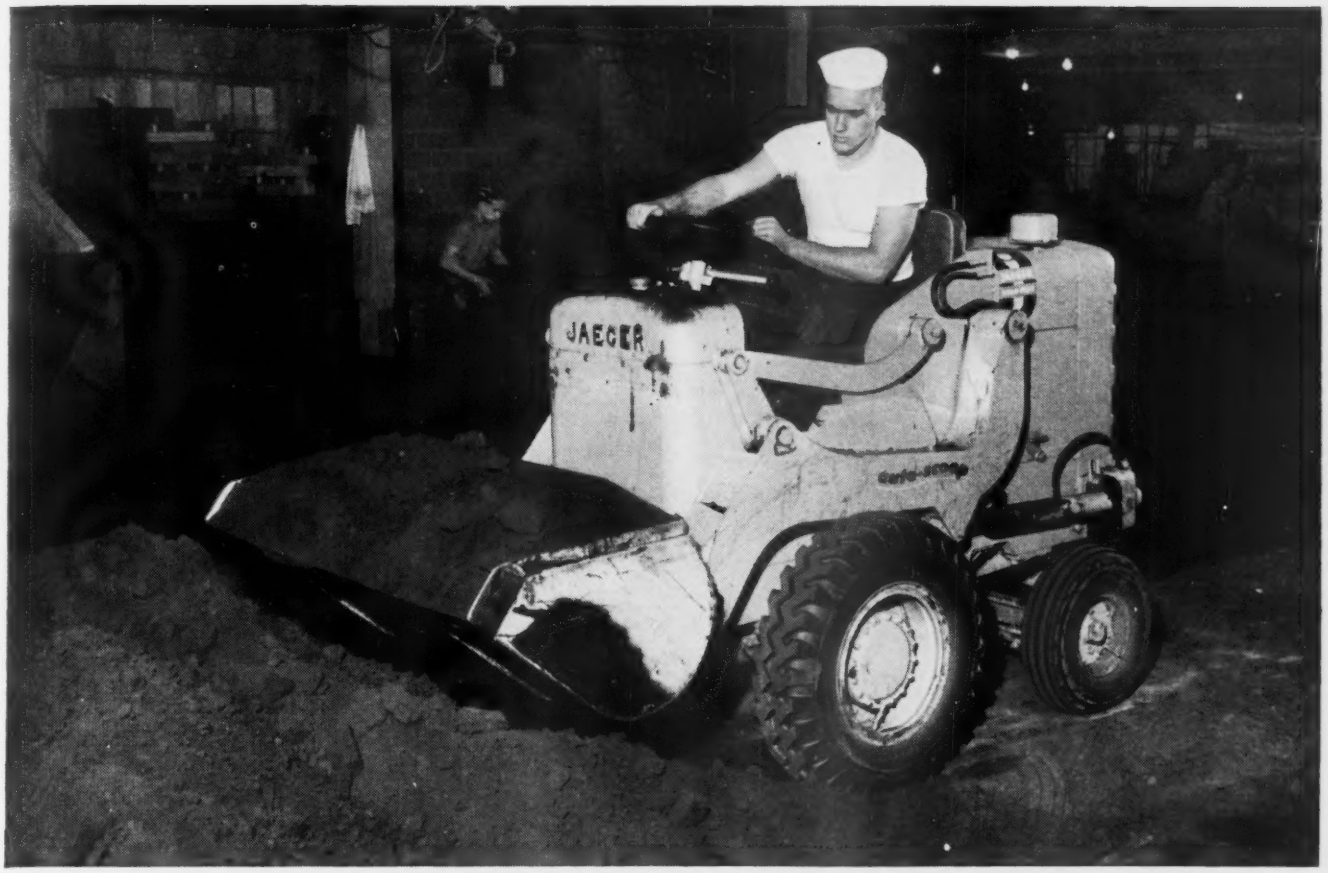
Nov. 14-17—Second International Automation Exposition, Navy Pier, Chicago.

Nov. 16-18—Steel Founders' Society, annual technical and operation conference, Hotel Carter, Cleveland.

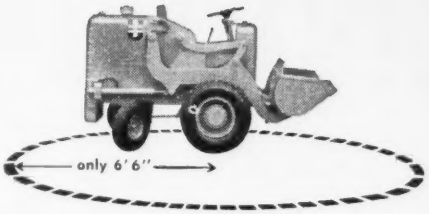
Nov. 16-19—Society for Experimental Stress Analysis, annual meeting and exhibit, Sherman Hotel, Chicago.

Dec. 1-2—Michigan Regional Foundry Conference, Michigan State College, East Lansing, Mich.

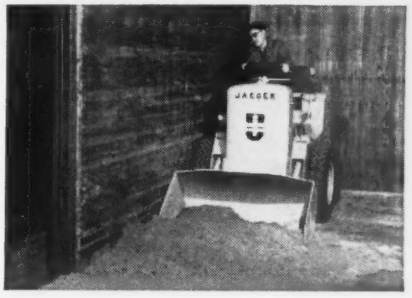
Dec. 7-9—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference, Hotel William Penn, Pittsburgh.



Jaeger Auto-Scoop loading molding sand for delivery to preparator. Other uses here include moving core sand, unloading box cars, handling castings.



Turns short in only 6'6" radius. Carries faster (up to 13.88 mph in reverse, 7.66 forward). Steep 45° bucket angle when in dumping position insures fast, clean discharge.



Wide bucket makes it possible to work flush against walls and into corners for clean pick-up, with resultant savings in hand labor.

Low-level bucket tilt-back permits full bucket loading and carrying as low as only 4½" above ground level.

Auto-Scoop speeds outdoor-indoor bulk handling for "Mansfield"

The quick, sure agility of the Jaeger Auto-Scoop makes fast work of delivering molding sand to preparators, moving core sand, unloading box cars, stockpiling and other jobs at Mansfield Brass & Aluminum Co., Mansfield, Ohio. They report that performance has been highly satisfactory, meeting their needs on every count, with substantial time savings.

That's because the Auto-Scoop is engineered for efficient scoop loader operation. Faster speeds (to 13.88 mph in reverse, 7.66 forward) cut maneuvering and travel time. Machine can turn in only 6½′ radius with bucket in carry position, making it easy to work in close quarters. High dumping clearance (4′6″ under lip, 6′8″ under hinge) and longer reach (2′7″) give wide range of load placement. Handles loads to 1200 lbs.

An advantage is low-level bucket tilt-back, which enables the operator to move into material and retract the bucket independently of hoisting, at ground level. Thus, he can load without excessive traction crowding, and can actually flip the load into the bucket when picking up small, loose stockpiles. He can also carry low, which provides low center of gravity, improves stability in travel, results in faster operation and keeps dusty materials from blowing into driver's eyes.

These are only a few of the time-saving, cost-saving advantages. For complete facts, send for Catalog L12-4 and name of nearest distributor.

For bigger work, Jaeger offers the 1 cu. yd. Load-Plus, with torque converter, power steering and either front-wheel or 4-wheel drive.

JAEGER LOAD-PLUS *auto-scoop*

The Jaeger Machine Company, 502 Dublin Avenue, Columbus 16, Ohio

AIR COMPRESSORS • PUMPS • MIXERS • PAVING MACHINES

Distributors throughout U. S. and Canada and Principal Cities of the World

How to

really cut snagging time

in your cleaning room!

switch to

CINCINNATI

PD

Snagging Wheels

WHEN snagging time in your cleaning room goes up—profits come down. Yet it's so easy to really cut snagging time, thus increasing production and your profits. Simply switch to CINCINNATI (PD) SNAGGING WHEELS—the greatest grinding wheel development in years.

CINCINNATI (PD) WHEELS will absolutely cut snagging time in your cleaning room . . . saving you money four important ways:

- FREER CUTTING—You can get more pounds of metal per hour with the grains and bonds specified by Cincinnati for your jobs. Operators like the fast, easy cutting action of CINCINNATI (PD) WHEELS.

- SELF-DRESSING ACTION—The CINCINNATI (PD) WHEELS specified for your job by CINCINNATI abrasive engineers require few, if any, dressings. With the right grade wheel, new cutting grits are bared as soon as old grits get dull and inefficient.

- LONGER WHEEL LIFE—Through longer life of CINCINNATI (PD) WHEELS, users have reported almost *double* the production per wheel. One customer, using a portable grinder, gets almost twice the life with a CINCINNATI (PD) Flared Cup. Another user, snagging cylinder blocks on a swing frame, has increased the production per wheel 45% with (PD) WHEELS.

- POSITIVE DUPLICATION (PD)—"On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind exactly alike.

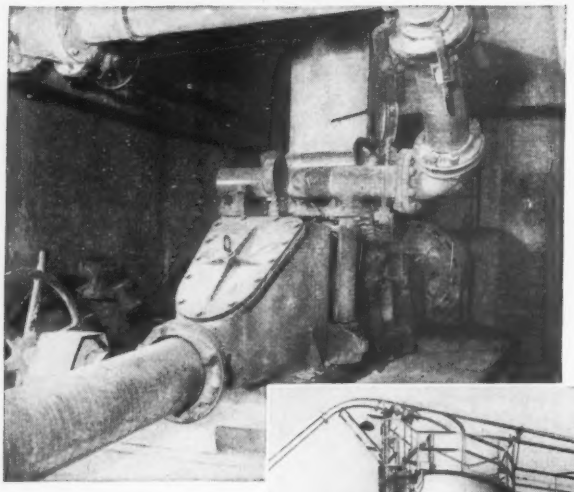
CINCINNATI (PD) WHEELS are made in vitrified and resinoid bonds for both ferrous and non-ferrous foundries and are available in a complete variety of sizes and shapes. *Yet these better, cost-cutting* CINCINNATI (PD) WHEELS *are priced no higher than ordinary wheels.*

We'll be happy to prove to you how CINCINNATI (PD) WHEELS can increase your production and cut costs and time in your cleaning room. Just contact us and we'll send one of our representatives. Wire, write or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

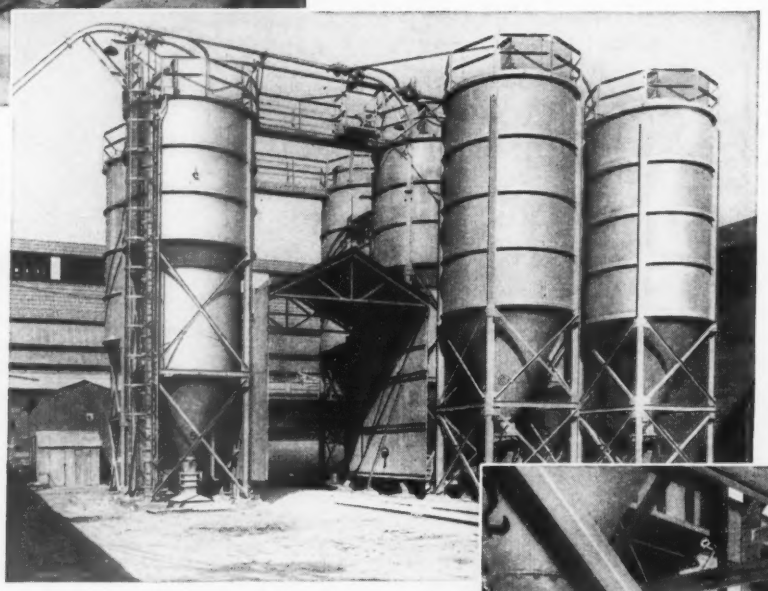
CINCINNATI
Grinding Wheels

A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

Fuller Air-Conveying System pays off for a steel foundry

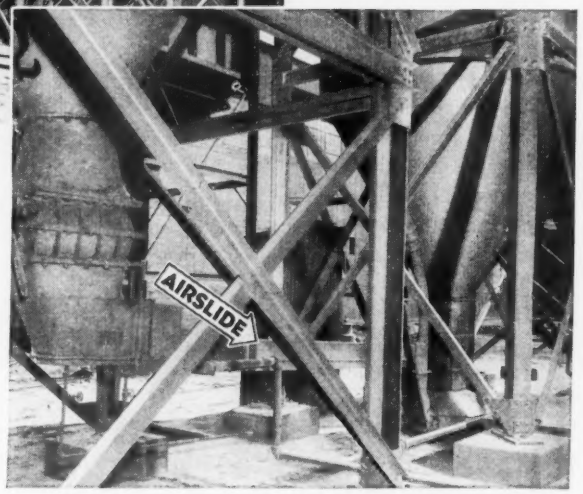


Above: One of two Fuller-Kinyon Portable Pumps which convey either from cars to storage, or from storage to supply bins above mixers.



Storage bins, conveying pipe lines from car unloading station to bins, and from bins to mixers.

Below: F-H Airslide from bin for discharge to pump.



General Steel Castings Corporation, Granite City, Illinois has greatly improved its handling of incoming sand ingredients by installing the Fuller-Kinyon Conveying System in conjunction with F-H Airslides.

Corn flour, silica flour, and bentonite, received in hopper-bottom cars, discharge direct to a Fuller-Kinyon Portable Pump, which conveys through pipe lines to a number of storage bins. Two such pumps, located in a tunnel, are mounted on trucks running on a narrow gage track for easy spotting under the cars or bins. The system is quite flexible—one pump is used mainly for unloading cars and delivering to storage, the other for reclaiming from storage for delivery to supply bins above mixers. Both pumps, however, can be used for either purpose. It is also possible to unload from cars and reclaim from storage simultaneously. Where bins are located so they cannot discharge directly to a pump, F-H Airslides convey to the pump.

Previous to the Fuller installation, materials were received in bags, manually unloaded, stored and transported to the mixers. These operations have all been eliminated, as well as waste and dust from broken bags, together with release of bag-storage space for other uses. Also, there is an inherent saving when purchasing materials in bulk. All of this means clean, efficient materials handling, plus more dollars on the profit side of the ledger.

Fuller air-conveying systems are in operation in thousands of plants throughout industry, cutting costs and increasing profits, day in and day out. The next time you have a materials-handling problem, why not get in touch with Fuller . . . chances are you will also profit as so many others have.

Fuller
. . . . pioneers in harnessing AIR

FULLER COMPANY
GENERAL AMERICAN

G-109
1479

FULLER COMPANY, Catasauqua, Pa.
GENERAL AMERICAN TRANSPORTATION CORPORATION SUBSIDIARY
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Ready to *BLAST!*

Reduce Nozzle Changing with Long-Life NORBIDE® Nozzles

These rugged nozzles — lined with NORBIDE Boron Carbide, the hardest manufactured material commercially available — maintain stream contour and last hundreds of hours longer than any other Nozzle made, eliminating expensive nozzle changing.

Available in a variety of sizes and styles. Try 'em on your toughest blasting jobs. For full details, write for your free copy of Form 543.

NORTON COMPANY
43 New Bond Street, Worcester 6, Mass.

NORTON
BORON CARBIDE

NORBIDE®... *The Longest Nozzle Life You Can Buy*

ALUMINIZED Protective Clothing

AO 1481 RA
SPRING TYPE LEGGING

Many prefer it because no adjustments are needed. Easy on, easy off. Spring steel frame protects leg from impact. Air space for insulation between leg and legging. Chrome-tanned leather flare with spring clip.

AO 5 x 357 GLOVE

Gunn style, 13½″ long. Horsesplit leather palm and fingers. Seam at base of fingers, double stitches, flat seam for extra comfort. One-piece aluminized asbestos back. Wing thumb. Full lining.

AO 204 RA-44 COAT

Provides complete aluminized protection for upper body. Wool collar protects neck. Snap fastener adjustment on cuffs for snug fit. All snap fasteners on front have leather-pull tabs for quick removal. All seams double stitched. Coat lengths 30″, 36″, 40″, 44″, 48″, 50″. Sizes: small, medium, large, extra large and extra extra large.

"It has paid for itself already" says a large user of **ALUMINIZED CLOTHING**

After a few months' use, a prominent steel company is completely sold on Aluminized Protective Clothing which REFLECTS 90% OF RADIANT HEAT, WEIGHS HALF AS MUCH AS CONVENTIONAL ASBESTOS, AND HAS SUPERIOR ABRASION-RESISTANCE (won't peel or crack)!

AO† Aluminized Asbestos Clothing is highly recommended for cupola and ladle pouring in foundries, open hearth, blast furnace and electric furnace tapping and other exposures to high radiant heat. AO Aluminized Duck is advised for less severe exposures. Check with your AO Safety Products Representative on leggings, spats, mittens, gloves, coats, jackets, sleeves, pants, overalls, coveralls, aprons, and hoods.

†T.M. Reg. by American Optical Company

For hot weather, hot job comfort . . . keep production up with AO Sweatbands.

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

NEW B&W MULRAM 3200 degree Refractory Ramming Mix

More than two years service under tough conditions of slagging and metal penetration have proved the economy of B&W's new ramming mix, Mulram. Used to form monolithic refractory structures, B&W Mulram, which has a crushed fused-mullite base, is recommended for temperatures up to 3200 F. Its combination of low porosity and permeability, when installed, give Mulram the highest possible resistance to metal or slag penetration.

Not only is Mulram's permeability low, but it actually decreases from the hot face to the cold face. This means an *increasing* resistance to penetration through the thickness of the lining. Standard firebrick, on the other hand, have a higher and constant permeability through their thickness.

This combination of maximum resistance to slag and metal penetration and the 3200 F use limit are the chief reasons why B&W Mulram has given superior service in applications like these:

- **Barium chloride salt bath furnaces**
- **Linings for indirect-arc electric furnaces melting iron, steel or non-ferrous metals**
- **Forehearths or holding ladles for gray and malleable iron**
- **Runners and slagging basins on continuous cupolas**
- **Crucible furnace walls.**

B&W Mulram is being rammed into the bottom of this salt bath furnace. Furnace walls are formed with B&W Mulram, backed up by B&W's 3000 degree castable, Kaocast, and insulated with B&W K-20 Insulating Concrete Mix.

Even when penetration is not a serious problem, B&W Mulram often proves economical in such applications as burner blocks or burner tunnels because of its volume stability and high hot-load strength after proper firing. Standard Mulram is made in 4-mesh size, wet or dry form (Mulram 4W and 4D). Other mesh sizes are available for special applications. Call or write your local B&W Refractories Engineer for complete information.

B&W REFRACTORIES PRODUCTS: B&W Allmul Firebrick • B&W 80 Firebrick
B&W Junior Firebrick • B&W Insulating Firebrick • B&W Refractory Castables, Plastics and Mortars
OTHER B&W PRODUCTS: Stationary & Marine Boilers and Component Equipment
Chemical Recovery Units • Seamless & Welded Tubes • Pulverizers • Fuel Burning Equipment
Pressure Vessels • Alloy Castings

BABCOCK & WILCOX
THE BABCOCK & WILCOX CO.
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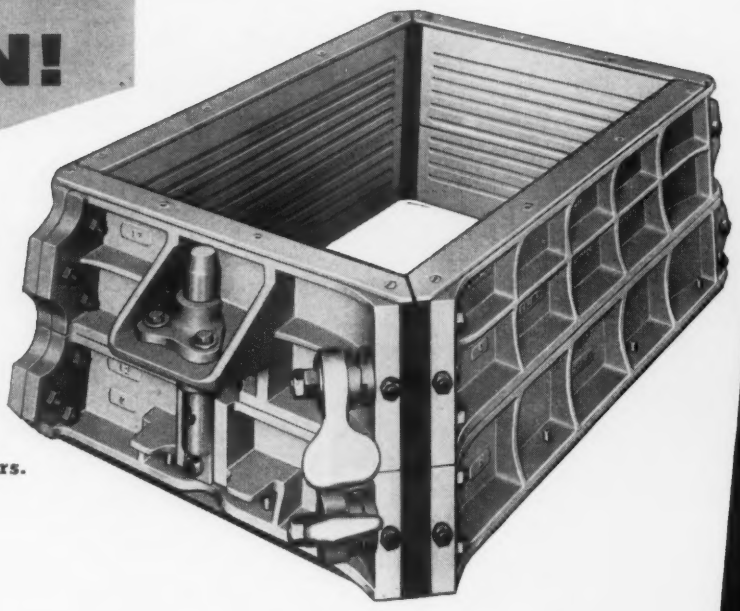
GENERAL OFFICES: 161 EAST 42ND ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

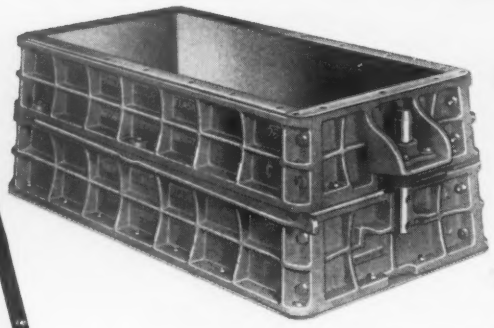
RS29

Performance PROVEN!



Fremont magnesium Spreadlock Flasks by actual use have been proved easier to handle . . . much sturdier than aluminum. They take abuse . . . last longer.

Accurately machined, they assure more exacting work. The men like them. No sand can lodge in the corners. Gaps are completely closed by long-life, replaceable live rubber inserts.



GUARANTEED PERFECT ALIGNMENT

The foolproof GROOVLOCK pin on Fremont Standard Slip Flasks is the difference.

SAVE IMPORTANT MONEY

New sides or ends can be quickly inserted in Fremont Cast Iron or Cast Aluminum Jackets. Entire jackets need never be scrapped.

Write today for free literature and prices. All orders given prompt attention.

The Fremont FLASK Co.

Fremont, Ohio

Another Norton ℞ *on the job!*

One of the 1200-pound Ajax induction furnaces used by The Duriron Company, Inc. of Dayton, Ohio. Melts are chiefly stainless steel alloys, tapped at 3200°F or higher. MAGNORITE cement, the Norton ℞ for lining and patching these furnaces, has resulted in substantial savings — not only in the amount and cost of cement, but in time and labor.

The Duriron Company, Inc. doubles heats-per-lining, cuts melting costs, maintains stainless steel quality with MAGNORITE cement*

If re-lining is too frequent a job in your induction furnace operations — if you're using up too much time, cement and money to get maximum heats — we suggest you consider MAGNORITE cement.

Take the experience of The Duriron Company, leading manufacturers of chemical process equipment made of stainless steel and other metals. Before trying MAGNORITE cement, their best previous lining material was giving an average of 68.2 heats per lining. Thorough test runs of MAGNORITE at the Duriron foundry show this Norton refractory material is averaging 140.5 heats per lining. And it is not only lasting twice as long as its best performing competitor, it is more refractory, it has 50% less slag volume on heats, and its freedom from shrinkage eliminates cracking. Another instance of how Norton refractories and refractory materials are *engineered and prescribed* to provide time-and-money-saving ℞'s.

Give MAGNORITE cement a test run

in one of your own furnaces. Note how it withstands temperatures up to 3250°F — how its high-rammed density resists metal penetration, erosion and chemical attack — how its slight expansion when sintered eliminates shrinkage cracks in the crucible lining.

Norton will be glad to specify MAGNORITE cement to your exact requirements, or to help you solve metal-melting problems. Working with MAGNORITE*, ALUNDUM*, CRYSTOLON* and Fused Stabilized Zirconia cements, Norton engineers will find ℞'s you need for efficiency and economy. For details, see your Norton Refractories Engineer, or write to NORTON COMPANY, Refractories Division, 305 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

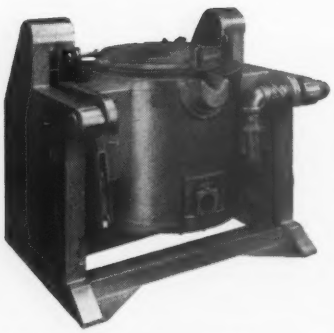
NORTON

REFRACTORIES

Engineered... ℞... Prescribed

Making better products... to make your products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries



Lindberg-Fisher type MNP nose-pour tilting crucible furnace. Pouring lip is located in the axis of tilting providing a constant pouring arc regardless of degree of furnace tilt. Capacities up to #800 crucible with brass, up to #1000 crucible with aluminum. Oil or gas fired. Described in Bulletin 57-A.

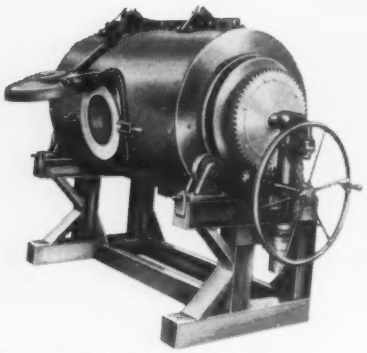
Lindberg-Fisher Electric Resistance Melting and Holding Furnace equipped with heavy duty resistance elements which give uniform distribution of heat, insuring long element and pot life. Capacities 250 to #1000 crucible.

For Non-Ferrous Metals

A complete line of

LINDBERG FISHER

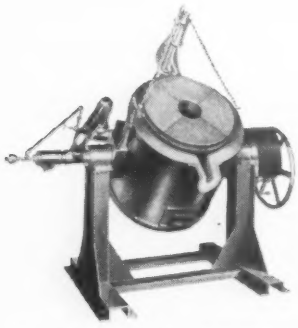
MELTING AND HOLDING FURNACES



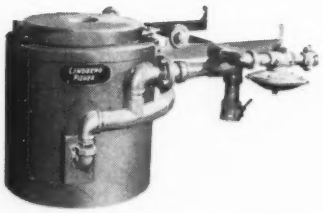
Lindberg-Fisher Simplex Rotary Open-Flame Furnace. Capacities to 2400 lbs. aluminum. 6000 lbs. brass. Oil or gas fired. Described in Bulletin 29-A.

For Melting Aluminum • brass • yellow brass bronze • copper • copper nickel alloys • lead magnesium • nickel • tin • zinc.

Because Lindberg-Fisher builds *all* kinds of melting equipment . . . gas . . . oil . . . electric . . . induction, and Carbon arc . . . L-F engineers are able to recommend, without prejudice, the proper type of furnace for *your* particular melting requirements.



Lindberg-Fisher type BB1 Hand-Tilt Crucible Furnace. Tilting mechanism consists of a hand wheel, driven through machined worm gear and pinion reducing gears. Capacities 50 to #400 crucible. Oil or gas fired. Described in Bulletin 400.



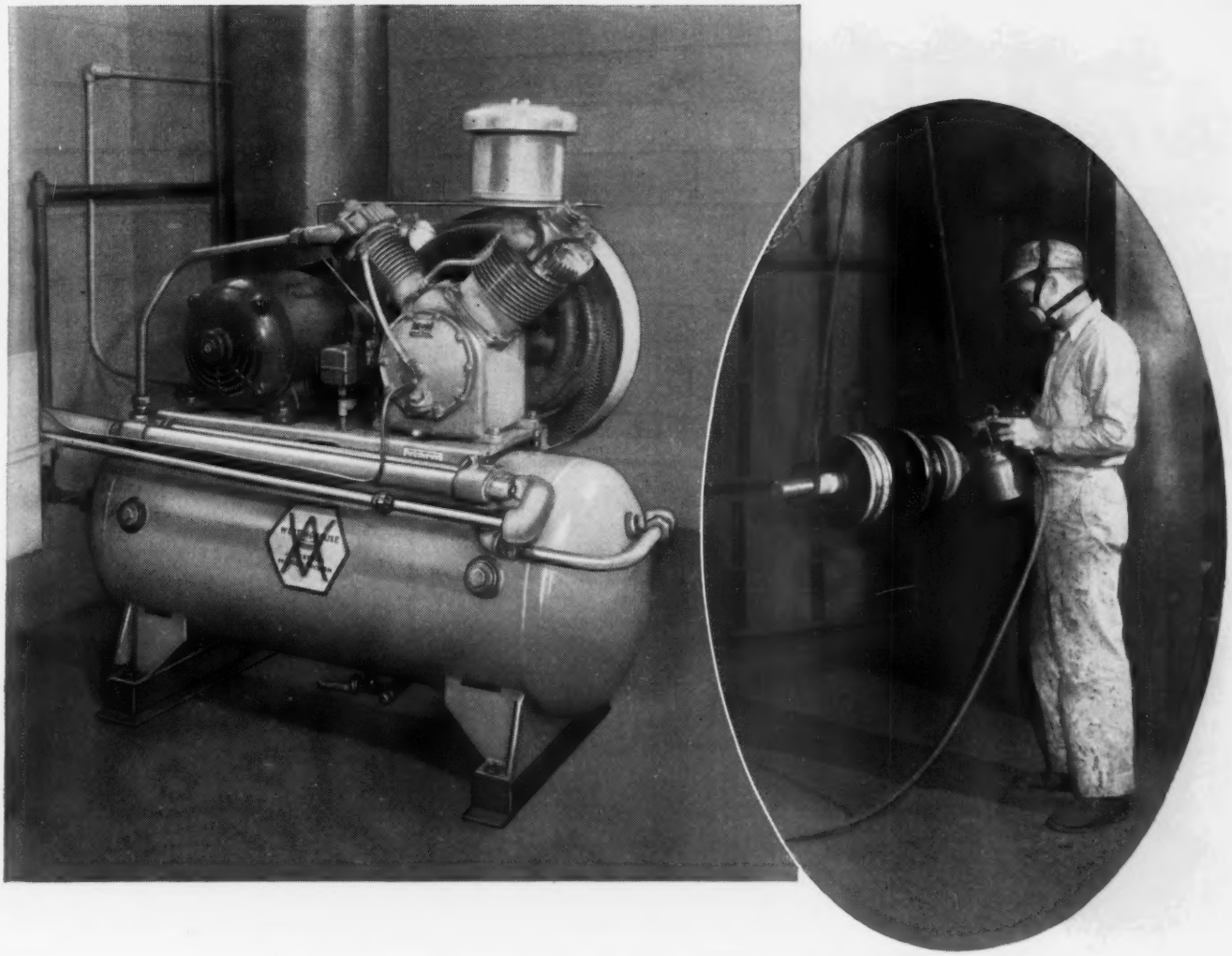
Lindberg-Fisher type SF stationary crucible furnace features rapid melting and is recommended for general foundry casting work. Capacities 30 to #400 crucible. Oil or gas fired. Described in Bulletin 301.

Melting specialists for 25 years

Sales and service offices in principal cities

LINDBERG FISHER **MELTING FURNACES**

A Division of Lindberg Engineering Company, 2453 West Hubbard Street • Chicago 12 • Illinois



Paint a Brighter Profit Picture

. . . use the flexibility of air to cut costs in your plant, and Westinghouse Air Compressors to cut the cost of your air

Spray painting, drilling, bolting, grinding, punch press operation — there are countless ways that the flexibility of air power cuts costs, improves profits.

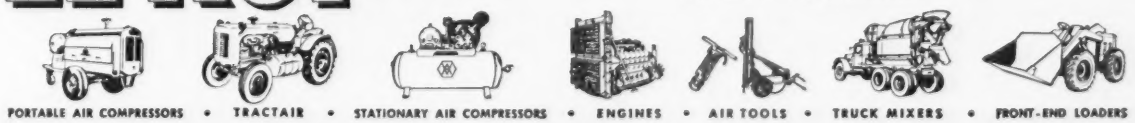
Because air power is so useful, it is important to have a dependable supply — important to have a Westinghouse Compressor.

Only Westinghouse can give you all 15 of these features: Type M inlet filter, disc valves, enclosed crankcase, anti-friction main bearings, pressure lubrication, low oil level protection, enclosed starting unloader, adequate cooling fins, "Y" type construction, high velocity flywheel fan, large size intercooler, thermal overload protection, greater weight, dual control, and one-year warranty period.

So paint a brighter profit picture. Use air power and get it at its low-cost best from a Westinghouse Air Compressor. Sizes up to 40 horsepower. Write for details.

LE ROI *Division of Westinghouse Air Brake Co.*

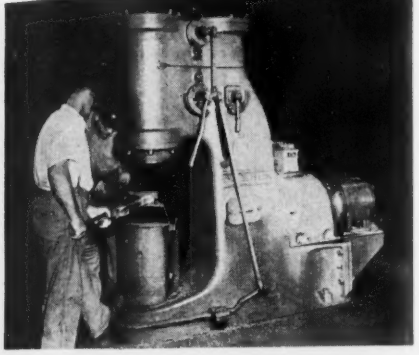
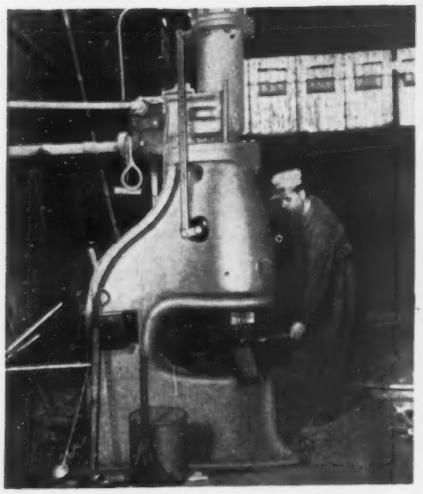
Milwaukee 14, Wisconsin

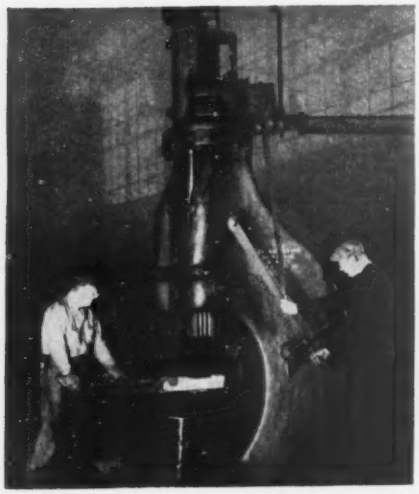
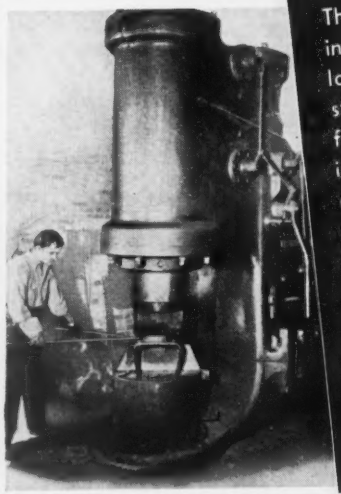


PORTABLE AIR COMPRESSORS • TRACTAIR • STATIONARY AIR COMPRESSORS • ENGINES • AIR TOOLS • TRUCK MIXERS • FRONT-END LOADERS

Distributors in all principal cities

For Flat Die Forging, Blacksmithing, or Tool Dressing

CALL it what you will, you have the choice of two superior hammers: the Chambersburg High Frame Hammer, operating on steam or air; and the Chambersburg Motor Driven Pneumatic Forging Hammer, which can operate anywhere, independent of steam or air lines. The High Frame Hammer has ample working space, adaptable to the forging of large discs and rings, the upsetting of high stems, etc., and has many other outstanding features. The Pneumatic Forging Hammer is completely self-contained, with its motor driven compressor built-in. It is capable of greater forging output than any other hammer of its type.

Either or both hammers, whether it be a 150 lb., a 600 lb. or a giant 6000 lb., will represent a profitable investment for your flat die, blacksmithing or tool dressing needs. Write today for Bulletins 1-L-9 and 16-L-9.

CHAMBERSBURG ENGINEERING COMPANY • CHAMBERSBURG, PENNA.

CHAMBERSBURG

THE HAMMER BUILDERS

Builders of THE IMPACTER

"FORGING IN MID-AIR"

Only FRONTIER
40-E Aluminum Alloy

with this composition* can give you these average properties

Zn	—5.0 —6.0	Cu	— .30 Max.
Mg	— .50— .70	Si	— .25 Max.
Cr	— .40— .60	Mn	— .30 Max.
Ti	— .15— .25	Al	—Remainder
Fe	—1.0 Max.		

* Protected by Comstock Patent 2146330. Alloy Data Booklet will be mailed free, giving complete story on 40-E Alloy. Write for your copy — today!

Yield Point — 30,000 lbs.
Tensile Strength — 37,000 lbs.
Elongation . . . 5%
Shock Resistance — Withstands direct and transmitted shock
Corrosion Resistance even in stressed condition
Excellent Machineability
Fine Grain. Withstands High Pressure.
No Heat Treatment Necessary.

Here's what happens when attempts are made to develop an Aluminum-Magnesium-Zinc Alloy *without infringing on the FRONTIER 40-E Patent*

- Copper Increased . . . . RESULT: Embrittles the alloy, reduces the elongation and tensile strength and increases stress corrosion.
- Silicon Increased . . . . RESULT: Reduces all physical properties.
- Manganese Increased . . RESULT: As manganese is increased over 0.4% the elongation and tensile strength are relatively reduced.
- Tin Added . . . . . RESULT: Yield Point and Tensile Strength reduced.
- Lead Added . . . . . RESULT: Additions of even small fractions of a percent have a decided effect on reducing tensile and yield strength.

No Al, Zn, Mg ALLOY CAN MATCH FRONTIER 40-E ALLOY

BECAUSE *"Almost"* JUST ISN'T GOOD ENOUGH

Use the BEST! Use FRONTIER 40-E

Technical Advice and Service is available to Designers and Licencees

FRONTIER BRONZE
CORPORATION
4878 PACKARD ROAD
NIAGARA FALLS, NEW YORK

Please send me a copy of the Alloy Data Book giving engineering and metallurgical Facts on the physical properties of Frontier "40-E".

Name.....
Company.....
Address.....
City..... State.....

Only COLEMAN TOWER® OVENS
provide all these major advantages

INCREASE PRODUCTIVITY

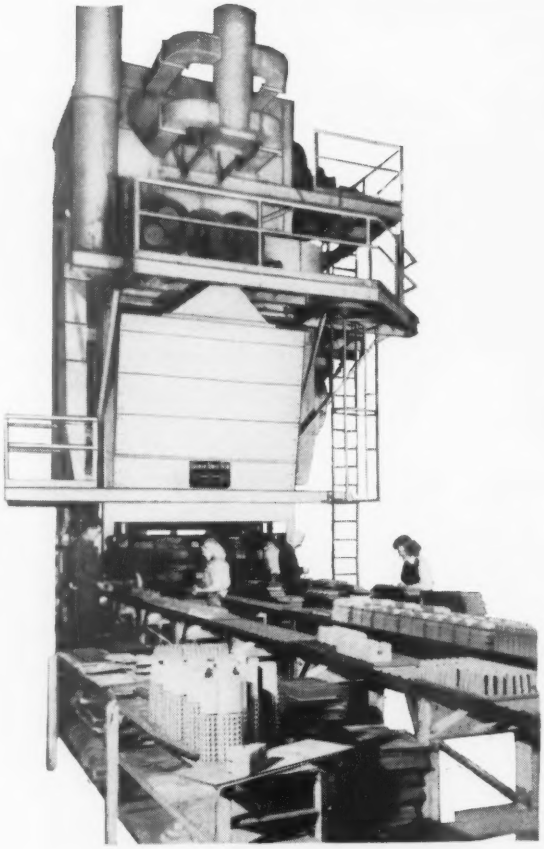
Savings through consistent, dependable production of perfectly baked cores; eliminating rejects, makeovers and casting losses due to improper core baking.

SAVE SPACE

Vertical design permits saving of approximately 75% of floor space over batch ovens of the same capacity. Cores are "smoked-off" and cooled before leaving unloading station.

REDUCE MAINTENANCE

Heavy duty construction for continuous, dependable performance and economical operation reduces maintenance cost to a minimum.



Coleman Tower ovens use only 25% of floor space required by batch type ovens of same capacity.

SAVE TIME

Cores of widely different sizes and shapes can be handled at the same time, all baked with consistent uniformity. Trucks, racks and money-wasting handling methods are eliminated.

SAVE BINDER

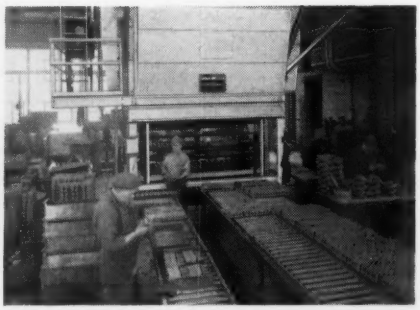
Proper core baking atmosphere and uniform temperature provide sizeable savings in conventional or high speed binders.

SAVE FUEL

The recovered heat is used over again, thus yielding important fuel saving. The most economical fuel available to you can be conveniently used.

Patented Open Center permits close, efficient grouping of coremakers around the oven... results in increased coremaker productivity.

3-way loading feature increases accessibility 300% over ordinary vertical oven designs.



Recuperative cooling system "smokes-off" and cools the cores before they reach unload station.

Coleman Tower Ovens are the most widely used continuous core baking ovens in the foundry industry. They have brought the advantages of mechanization to large and small foundries and have made important cost reductions. Why not find out whether Coleman Tower Ovens can bring the same savings to you? Our engineers are available without obligation to make practical recommendations for your particular requirements... call or write today!

WRITE FOR BULLETIN 54

THE FOUNDRY EQUIPMENT COMPANY
1821 COLUMBUS ROAD **CLEVELAND 13, OHIO**

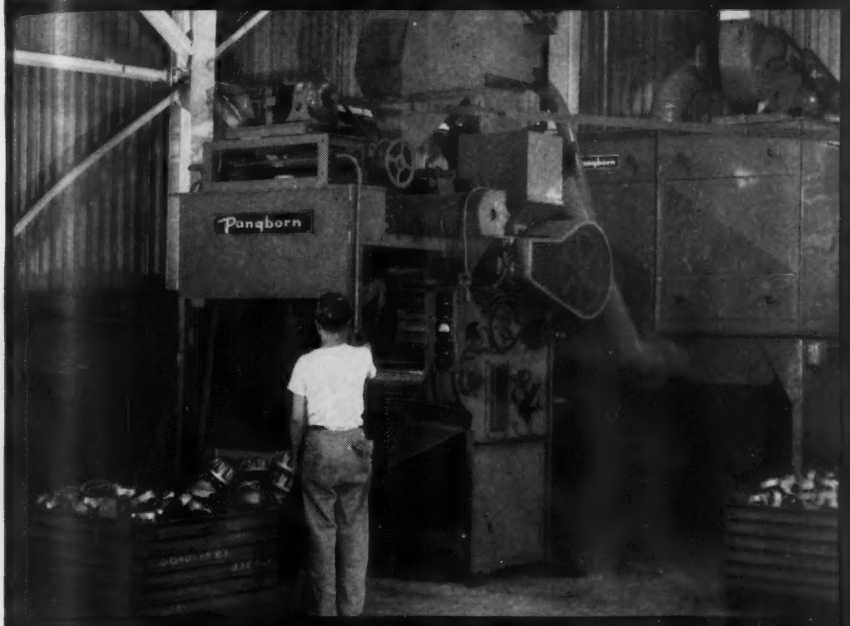
WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

A COMPLETE RANGE OF TYPES AND SIZES

for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

Looking for cheaper blast cleaning?



PANGBORN BLAST CLEANS CHEAPER BECAUSE famous Pangborn Rotoblast cleans *fast.* Rotoblast throws a heavy volume of abrasive quickly over a large surface area. This speed of operation increases your rate of production, cuts operating expenses.

◄ BLASTMASTER Barrel for batch cleaning

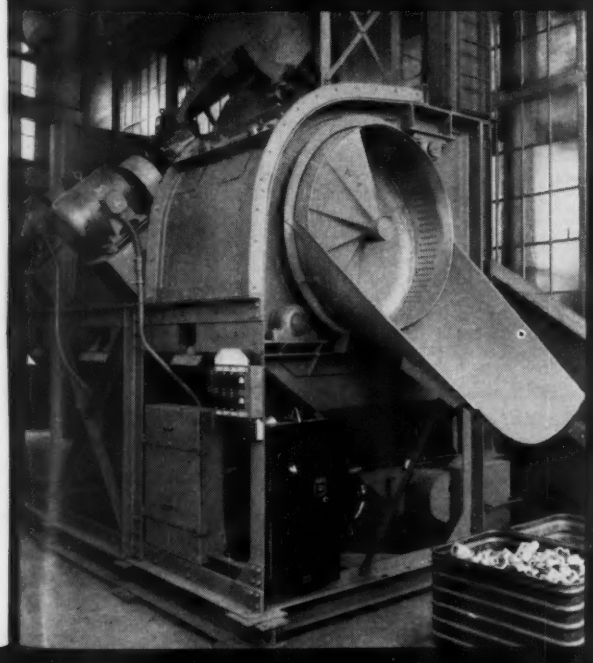
Pangborn...

Pangborn...

PANGBORN BLAST CLEANS CHEAPER BECAUSE Rotoblast actually does a terrific job! Its uniform cleaning action economically produces a more desirable, brighter finish and allows more efficient use of high-speed machine tools in further processing.

ROTOBLAST ROOM for miscellaneous work ►

Pangborn...



PANGBORN BLAST CLEANS CHEAPER BECAUSE Rotoblast saves labor costs . . . because it requires less power to operate . . . because its versatility accommodates a wide range of work. Send for Bulletin 227 today. Write PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

◄ ROTOBLAST "GO" Barrel for continuous-flow requirements

Whatever Pangborn Rotoblast machine best suits *your* requirements . . .

Pangborn

BLAST CLEANS CHEAPER

Rotoblast Blastmaster® & Continuous-Flo Barrel

Rotoblast Tables & Table-Rooms

Special Blast Rooms & Cabinets

Pangborn Dust Control Equipment

Malleabrasive® Shot & Grit

THE H. P. DEUSCHER COMPANY

TELEPHONE 3-1610 — ESTABLISHED 1870

Gray Iron Castings

SEVENTH & HANOVER STS
HAMILTON, OHIO

April 5, 1955

Newaygo Engineering Company
Newaygo, Michigan

Attention: Mr. R. J. Bell, Vice President

Gentlemen:

We have found through the many years of our operation that any jobbing foundry such as ourselves, which produces a wide and varied line of castings for others, must be constantly ready and able to modify or change methods of production to best meet the ever changing demands of the customer.

Now that our "Handy Sandy" units have been in service for a number of months over ten squeezer and rollover machines, we can truthfully state that we are quite happy with our investment made in these semi-portable overhead sand handling units. By the installation of a more flexible overhead sand handling system such as the "Handy Sandy" units, we are in a better position to shift our production facilities to meet the changing demand than if we had made a major investment in the installation of a permanent, inflexible overhead sand system.

Our employees are quite happy with the installation. Naturally, "Handy Sandy" units have lightened some of their physical load, and they have displayed their usual loyal attitude by increasing daily production. They have made some very excellent increases in production with this installation of "Handy Sandy" units.

Yes sir--we are very well pleased with quality of the product and the service which we have received from Newaygo.

Thanking you for your fine cooperation at all times, we are

Very sincerely yours,

THE H. P. DEUSCHER COMPANY

Earl H. Thompson

Earl H. Thompson, Treasurer

EHT/lr

THE H. P. DEUSCHER CO.

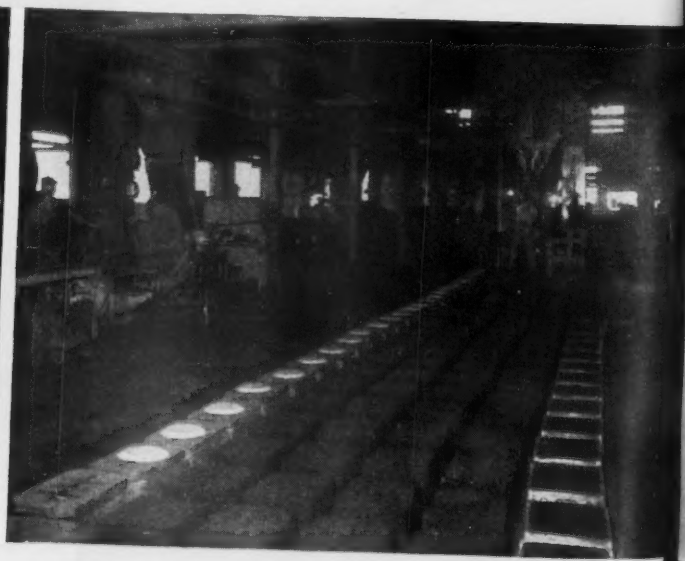
NEWAYGO

sand handling equipment

serves leading foundries

in Hamilton, Ohio

Close up view of one of the automatic Handy Sandy Units. Operator is finishing a 34″ x 34″ mold on a jolt rollover machine. In this foundry ten Handy Sandys serve a wide range of flasks, the smallest being 12″ x 12″.



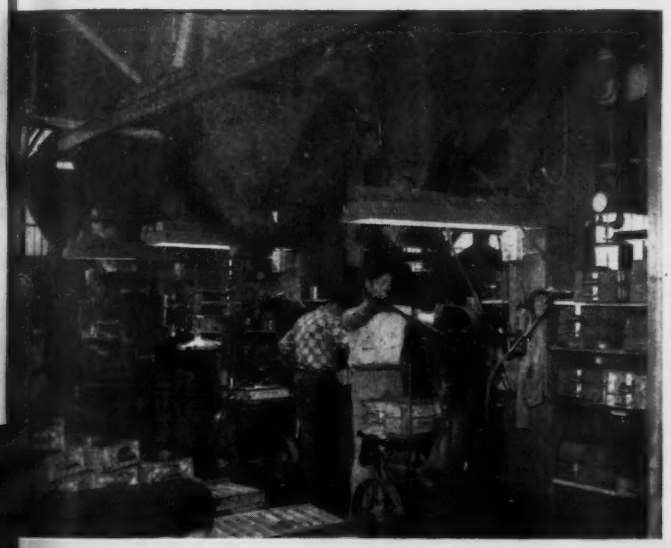
Evidence of increased mold production is shown in the above photo of a set out floor that is being served by one Handy Sandy unit. Castings vary from 8 ounces to 300 pounds each. Pour off is once a day.

HAMILTON BRASS AND ALUMINUM CASTING COMPANY — ONE OF THE FIRST USERS OF HANDY SANDY EQUIPMENT — MAINTAINS CONSTANT CASTING PRODUCTION AND MAKES MOLDERS JOB EASIER

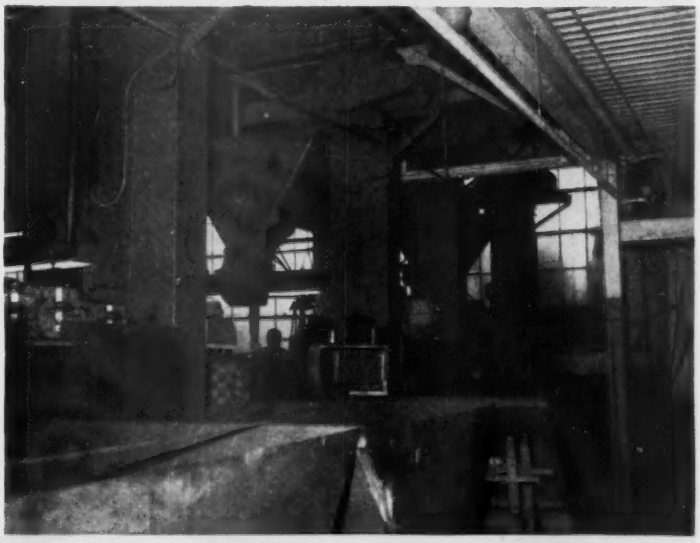
Five years ago this foundry ordered one of the first Handy Sandy units manufactured by Newaygo. The idea was to increase casting production and make the molders job easier. Handy Sandy was so successful that since then Charles T. Koehler, Vice President, states they have reordered three times and now have a battery of six Handy Sandys serving five cope and drag machines and one stack molder. Plans for ordering a seventh Twin Hopper Handy Sandy are under way.

The entire Handy Sandy System is contained in a 40′ x 53′ floor space which includes loading, molding, set out and pouring area. Continuous pouroff is done by an overhead crane system.

Showing a partial view of the compact molding set up. Molds are set out on gravity conveyors.



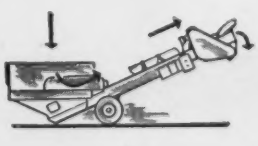
A rear view of the Handy Sandy units where lower feed hoppers are fed by front end loaders. Each molder has individual sand storage and operates independently of the others.



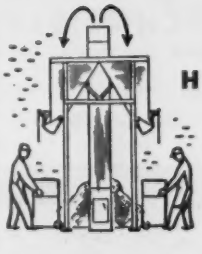
HANDY SANDY

puts sand overhead, eliminating shoveling for the molder.

REDDY SANDY



takes the hard work out of shakeout and sand preparation.



SUPER HANDY SANDY

a high capacity individual-floor sand handling unit.

Also Engineers and Manufacturers of Complete Sand Handling Systems

A copy of "Planned Mechanization for Foundries" is yours for the asking. Write, wire, or phone today.

NEWAYGO engineering company
NEWAYGO, MICHIGAN

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

APPROVED and PROVED
NATION WIDE!

"SW" CUPOLA COLLECTOR PICKED FOR PERFORMANCE AND MONEY-SAVING VALUE

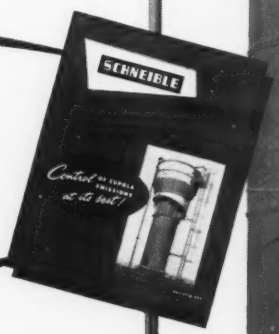
More and more foundries, small and large, are realizing the benefits from the performance of Schneible "SW" Cupola Collectors for control of cupola fly-ash and smoke.

Since such improvements are major expenditures it is important that purchase of *Cupola Collector* equipment be based on *proved performance* to assure maximum dollar value with minimum maintenance, and long usefulness.

Be sure to investigate the many benefits that are yours with Schneible "SW" Cupola Collectors, before you decide on any *similar* equipment. Only Schneible patented features gives you all the money-saving advantages.

YOUR BULLETIN ON REQUEST

For the complete story on the "SW" Cupola Collector write today for your copy of Bulletin No. 554.



CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station Detroit 2, Michigan

EUROPEAN LICENSEE: ELEX S. A., ZURICH, SWITZERLAND
CABLE ADDRESS FOR FOREIGN INQUIRIES: CBSCO

SCHNEIBLE

PRODUCTS

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compsensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear-Proof" Centrifugal Slurry Pumps

Late News

NONFERROUS INGOT: Protest against the exportation of aluminum scrap was made at a Washington hearing last week by James W. Wolfe, executive secretary, Non-Ferrous Founders' Society. Testifying before a House committee, Mr. Wolfe said that many foundries dependent on secondary ingot have been squeezed profit-wise because the shortage of scrap has forced ingot producers to raise their prices substantially. He indicated that this has resulted in a considerable loss in business to aluminum foundries. For a number of months secondary ingot has been selling well above the price of primary ingot; ordinarily these positions are reversed. Mr. Wolfe urged that "until all metal reaches its historic position and inventories are built up as they should be, all export licenses be denied."

CENSUS: Processing of questionnaires returned for the 1954 Census of Manufactures is to be started shortly by the Department of Commerce. The forms—more than 2¼ million of them—were sent out to industry in January, and Commerce is urging those companies which have not completed them to do so promptly. First statistics are expected to be released early this fall. This is the first complete census taken since 1947. Data compiled in the study are used widely by industry.

CORE BINDERS: Sharing interest with the carbon dioxide process for hardening cores and molds are two recently developed binders which are intended to increase the green strength of cores. Absence of water in the core sand mixture reduces subsequent baking time substantially. In the case of certain cores the high green strength permits elimination of supporting rods or wires. Developed originally in Europe, arrangements are being made to offer the binders in this country.

ALUMINUM PRODUCTION: Output of primary aluminum slipped in April to about 126,000 tons, off 4000 tons from the all-time peak reached in March. The year to date shows a gain of more than 31,000 tons over the 1954 period. Further increases are expected, based on favorable reports concerning streams providing hydroelectric power in the Pacific Northwest.

COUNCIL MEMBER: Investment Casting Institute has accepted the invitation of the National Castings Council to become a member. It becomes the eleventh organization associated with the foundry industry to join NCC.

FOUNDRY SOLD: Phillips Foundry Co., 2200 S St., Bakersfield, Calif., has been sold to Pacific Valves Co. Pacific recently completed a new manufacturing plant in Fontana, Calif. The Bakersfield foundry, which is planning expansion in capacity, will concentrate on production of steel valve castings but will also continue to do some jobbing work.

MORE OVENS: U. S. Pipe & Foundry Co., Birmingham, has contracted with Koppers Co. Inc. for the building of a battery of 30 coke ovens. A similar battery was installed in 1952. The second battery will bring the company's production capacity to 3500 tons of coke a day. U. S. Pipe's Sloss-Sheffield division operates two blast furnaces in Birmingham.

MERGER: Exothermic Research Products Inc., Buffalo, has been consolidated with Exomet Inc., Conneaut, O. Alex H. Colwell, president of the former, now is associated with Exomet, which will manufacture and market all products of Exothermic Research formerly made in Buffalo.

PERSONALS: Mrs. Claude B. Schneible has been elected to succeed her late husband as president of the Claude B. Schneible Co., Detroit . . . W. H. Osborne, vice president, Acme Aluminum Foundry Co., Chicago, has been elected executive vice president and continues as secretary and treasurer. C. L. Sidinger, works manager since 1946, has been elected vice president in charge of manufacturing and engineering . . . A. B. Keckley, general manager, and W. M. Ferguson, sales manager, Texas Electric Steel Casting Co., Houston, Tex., have been advanced to vice presidents. Thomas H. Shartle Jr. has been named a director . . . Roy O. Schiebel, eastern district and

export manager, Magnaflux Corp., Chicago, has been appointed sales manager . . . Norman R. Kidd has been named manager of C. O. Bartlett & Snow Co.'s newly opened service and parts sales division . . . Fred Biggs has been made chairman, Brake Shoe & Castings Division, American Brake Shoe Co., and has been succeeded as president by Stephen S. Conway.

ANNIVERSARY: American Foundry, Los Angeles, recently marked its 35th anniversary. Established in April, 1920, by Dominic Meaglia, president, the firm now is adding facilities to its main plant. A new plant at Corona, Calif., will expand the company's capacity for production of cast iron soil pipe and fittings and drainage fittings.

NICKEL: Government stockpiling and defense needs accounted for some 40 per cent of the total free world supply of nickel (195,000 tons) in 1954, acording to Dr. John F. Thompson, chairman, International Nickel Co. of Canada Ltd. He expects production capacity to increase by 1958 to at least 225,000 tons. While stockpiling is likely to continue, there are indications that the share of total supply for this purpose may be modified. This would mean that more nickel will be available this year for civilian use than in 1954.

OBITUARY: Paul M. Wiener, president, Paul M. Wiener Foundry Co., Muskegon, Mich., died Apr. 29 . . . Charles M. Lewis, 61, president, Badger Malleable & Mfg. Co., Milwaukee, died May 11 . . . Elmer A. Rich Jr., 67, retired officer and director of the American Wheelabrator & Equipment Corp., Mishawaka, Ind., died May 11 . . . Charles D. Wiman, 63, president of Deere & Co., Moline, Ill., died May 12.

MISCELLANY: American Locomotive Co. has changed its name to Alco Products Inc. to reflect the company's increasingly diversified operations . . . Consolidation of Durez Plastics & Chemicals Inc. with Hooker Electrochemical Co. has been approved by stockholders of both companies . . . Aluminum Industries Inc., Cincinnati, plans a plant modernization and expansion program to cost $1 million . . . Continental Foundry & Machine Co., East Chicago, Ind., has been granted rapid tax amortization covering improved facilities costing $467,350.

Prices of Foundry Metals and Coke

(As of May 23, 1955)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE	
Connellsville	$16.50-17.00
OVEN	
Birmingham	$22.65
Buffalo	25.00
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Indianapolis	24.25
Kearny, N. J.	24.50
Lone Star, Tex.	18.50
Milwaukee	25.25
Montreal, Que.	26.25
New England, deld.	26.05
Painesville, O.	25.50
Philadelphia	24.00
Portsmouth, O.	24.00
St. Louis, del.	26.00
St. Paul	23.75
Swedeland, Pa.	24.00
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$58.00	$59.00
Birmingham	52.88	....
Buffalo	56.50	57.00
Chicago	56.50	56.50
Cleveland	56.50	56.50
Duluth	56.50	56.50
Erie, Pa.	56.50	56.50
Everett, Mass.	61.00	61.50
Fontana, Calif.	62.50	....
Geneva, Utah	56.50	....
Granite City, Ill.	58.40	58.90
Lone Star, Tex.	52.50	52.50
Neville Island (Pittsburgh)	56.50	56.50
Steelton, Pa.	58.50	59.00
Swedeland, Pa.	58.50	59.00
Toledo, O.	56.50	56.50
Troy, N. Y.	58.50	59.00
Youngstown, O.	....	56.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 35.50; tin bronze, No. 225, 47.50; No. 245, 40.75; high-leaded tin bronze, No. 305, 39.00; No. 1 yellow, No. 405, 30.75; manganese bronze, No. 421, 33.25.

ALUMINUM: 99 per cent plus, primary ingots 23.20. Secondary No. 12 alloy 26.00-26.50. Deoxidizing grades: No. 1 27.00-27.25; No. 4 24.50-24.75.

MAGNESIUM: 99.8 per cent notched ingots 29.25, fo.o.b. Freeport, Tex. (10,000 lb or more).

COPPER: Electrolytic 36.00, delivered Connecticut valley.

ZINC: High grade 13.35, delivered. Die casting alloy No. 3 16.00, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$32.00-33.00	**$45.00-46.00	.....	.....	.....	.....	$45.00-46.00
Boston*	**27.00-28.50	**30.00-31.00	.....	.....	**33.00-34.00	.....	.....
Buffalo	30.00-31.00	**37.00-38.00	.....	.....	**42.00-43.00	.....	42.00-43.00
Chicago	33.00-35.00	40.00-41.00	.....	44.00-45.00	44.00-45.00	45.00-46.00	49.00-51.00
Cincinnati*	**31.50-32.50	**39.00-40.00	**35.00	.....	**44.00-45.00	.....	47.00-48.00
Cleveland	31.00-32.00	43.00-44.00	33.00-34.00	44.00-45.00	44.00-45.00	43.00-44.00	49.00-51.00
Detroit*	**27.50	**37.00	**28.00	**42.00	.....	**35.00	.....
Los Angeles	28.00	**42.00-44.00	.....	.....	.....	.....	.....
New York*	31.00-32.00	32.00-33.00	33.00-34.00	.....	.....	.....	.....
Philadelphia	35.50-36.50	37.00-38.00	40.00-41.00	.....	44.00	44.00	.....
Pittsburgh	34.00-35.00	39.00-40.00	34.00-35.00	.....	43.00-44.00	.....	47.00-49.00
St. Louis*	31.00	40.00	33.00	42.00	.....	.....	46.00
San Francisco	30.00	40.00-43.00	36.00	39.00	48.00	.....	.....
Seattle	33.00	36.00-40.00	28.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point.

For Cleaner Surfaces, Better Shakeout, Try WHITEHEAD'S NEW LYQUAFLOUR

Our new plant has just been completed at Irwin, Penna., to produce the new DOUBLE-STRENGTH LYQUAFLOUR. This compound of a special hydrocarbon and woodflour improves castings and mold conditions for all types of metals. Highly recommended for the advantages listed below:

- One sand additive controls both peel and expansion
- Good shakeout saves sand
- Imparts highest flowability to sand mixture to give pattern true finish
- 2% initial treatment of sand and as little as ¼ of 1% to reactivate does the job
- Replaces any carbon or hydrocarbon materials now used
- Eliminates dust at the muller
- Castings peel excellently which reduces cleaning room time
- Reduces penetration and burn-on
- Overcomes sand expansion defects, maintains good compression strength
- Improves molding, "feel", and "moldability"
- No rigid control required
- Permits hard ramming
- Less ramming required, more molds per hour
- Less temper water needed

Whitehead Brothers COMPANY

Established 1841

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence, R. I.

Manufacturers of

LYQUAGRIP
Ready-to-use core paste

JOINT SEAL
Plastic compound for perfect sealing

LYQUAFACE
The liquid sand grain coating

DOB-IT
Ready-to-use core mudding compound

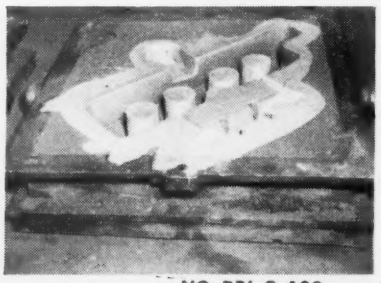
Speed

GREY IRON CASTING *production* *with* THIEM

NO DRI

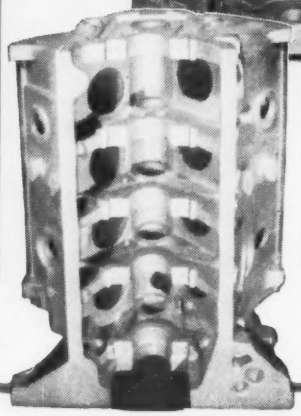
G-100

NO DRI G-100 . . . application — can be sprayed, swabbed or brushed.
Photo. Bucyrus-Erie Co. Erie, Pa.



NO DRI G-100 . . . coated mold.
Photo. E. W. Bliss Co. Toledo, Ohio

NO DRI G-100 . . . excellent casting finish.
Photo. Bucyrus-Erie Co. Erie, Pa.



NO DRI G-100 . . . *V-8 engine block — leading automotive manufacturer.

*unretouched photographs

THIEM NO DRI G-100

REDUCES MOLD COSTS
Eliminates torching and oven drying.

INCREASES MOLD PRODUCTION
Permits rapid flask turnover.

CONTROLS PERFORMANCE
Assures safety in production . . . contains no moisture . . . closed molds will not draw dampness. Produces a synthetic resinous, waterproof film which prevents wet-back or spalling when in contact with molten metal.

QUALITY RESULTS
Excellent casting finish.

Ask your Thiem man for all the facts on NO DRI G-100 — or write direct.

Best by Test!

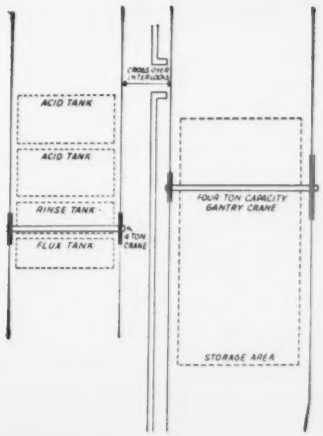
Thiem

PRODUCTS, INC., Milwaukee 14, Wis.

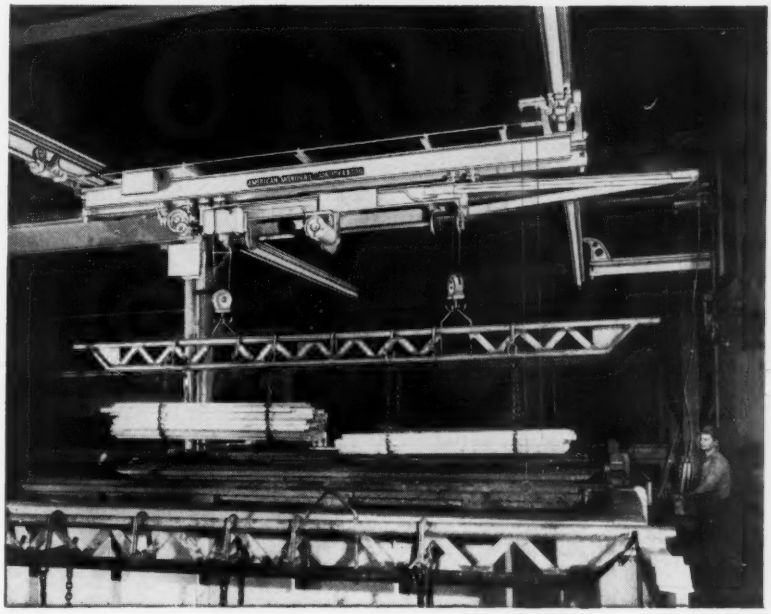
Manufacturers of foundry products exclusively — Ferro Kote • Krome Kote • Dri Lite • NF-100 • No Dri G-100 Mold Lite • Krome Kote Z • Krome Kote NF • Core Oil Mudding Compound • Chill Kote • Core-Hesive Core Paste.

THIEM DISTRIBUTORS

Brumley-Donaldson Company	Los Angeles & Oakland, Calif.
Canfield Foundry Supplies & Equip.	Kansas City, Kansas
Combined Supply & Equip. Co., Inc.	Buffalo, New York
Klein-Farris Company, Inc.	Boston, Massachusetts
Kramer Industrial Supply, Inc.	Denver, Colorado
LaGrand Industrial Supply Co.	Portland, Oregon
Manufacturers Equipment & Supply Co.	Chattanooga, Tennessee and Birmingham, Alabama
Springfield Facing, Inc.	Harrison, New Jersey
Horace G. Stults	York, Pennsylvania
Western Foundry Sand Company	Seattle, Washington
Walter A. Zeis	Webster Groves, Missouri
Don Barnes Foundry Supplies & Equip.	Hamilton, Ontario, Canada



AMERICAN MONORAIL GANTRY CRANE SYSTEM *speeds galvanizing!*



Steel fence posts travel from fabrication to galvanizing over a gantry bridge which interlocks at a crossover track through doorway for passage to the MonoRail crane serving the tanks in the plating room.

All travel on the 4-ton system is motor operated and controlled by push-button station in the operator's hand.

Here is truly team-work handling that results in cost savings as well as increased tonnage through the galvanizing process. It is a typical example of American MonoRail engineering available at no obligation for the solution of your handling problems.

Send for Bulletin C-1 illustrating hundreds of successful Mono-Rail installations.

AMERICAN OVERHEAD HANDLING EQUIPMENT

MONORAIL COMPANY

13104 ATHENS AVENUE • CLEVELAND 7, OHIO

. . . AND GET *More* PERFECT CASTINGS

DELTA Z-KOAT and ZZ-KOAT Washes are easy to mix and easier to apply. After mixing, there is no danger of precipitation and, when dried, they are completely moisture-proof. Applied by swabbing, dipping or brushing, they adhere uniformly to the sand and produce smooth, highly-refractory surfaces.

Both DELTA Z-KOAT and ZZ-KOAT Washes have unusually high fusion points and, because of their high heat conductivity, provide a more rapid surface-metal set. Both washes are economical to use.

DELTA Z-KOAT contains zirconium plus other high fusion refractories and DELTA ZZ-KOAT is an all-zirconium type wash.

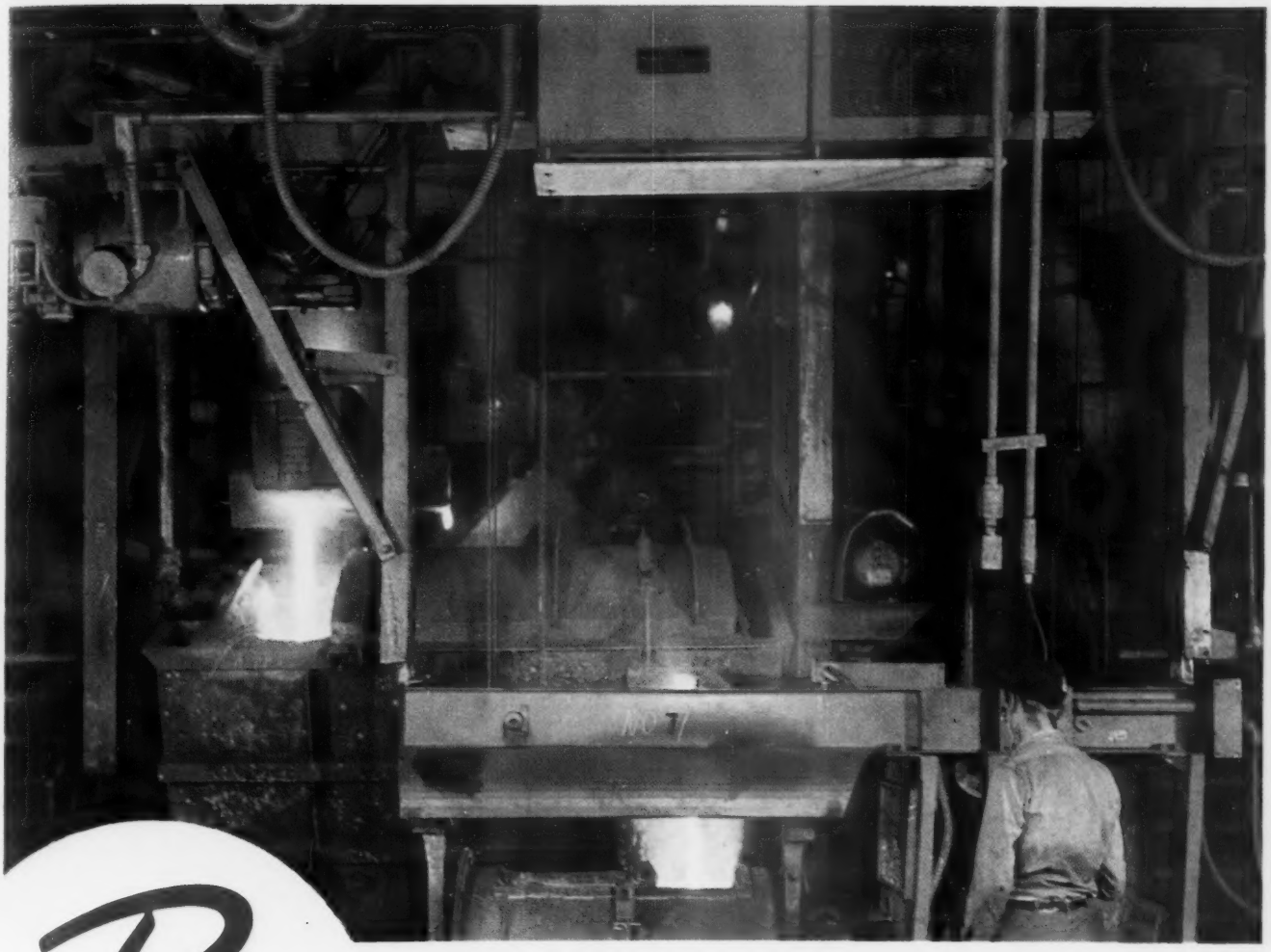
DELTA

Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN



Ross.... Complete Line of Air Valves for Simpler Maintenance... Less Cost

Standardize on Ross Valves for maximum efficiency... minimum service expense. • Ross valves are available in thousands of standard types in ⅛″ to 2″ pipe sizes. • Prompt, expert engineering service around the world. • Ask your nearby Ross representative to acquaint you with the complete Ross valve line for foundries.

ROSS Control VALVES

Ross OPERATING VALVE COMPANY

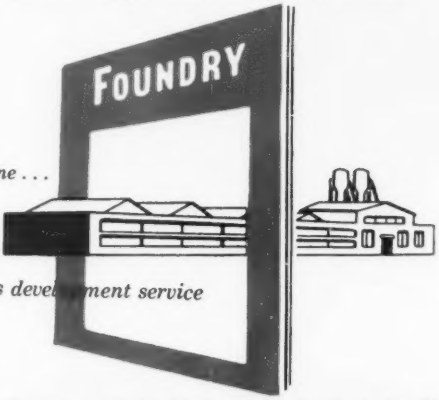
120 E. GOLDEN GATE AVENUE • DETROIT 3 • MICHIGAN

"Look what we're missing!"

"We think we're doing a pretty good job in the foundry industry. But look what *these cards* tell us," said one sales executive, "we're missing a lot of our potential."

It's amazing how often we've been hearing similar remarks when advertising and sales executives begin to check FOUNDRY Sales Control cards against their own sales performance records.

In an industry that's spending one million dollars *an hour* for materials and supplies, it's worth some *specialized* effort to go after a larger chunk of the business. These Sales Control cards are just one step in FOUNDRY's PLUS 5 Sales Development Service that helps you evaluate potentials, and plan a concentrated advertising and selling program to improve sales to foundries. Write for the folder that outlines FOUNDRY's PLUS 5 Sales Development Service. This unique service is provided exclusively by FOUNDRY – the magazine that covers every worthwhile foundry in the industry. FOUNDRY, Penton Bldg., Cleveland 13, Ohio.



A PENTON PUBLICATION

Do you really know your foundry production costs?

There *is* a practical way to compare your cost figures with the most progressive foundries in your area . . . to put your breakdown of departmental costs next to theirs to see where you may be out of line. Of course, identities are not necessary, so they are not revealed. Begin now to learn the up-to-date methods others have used to bring production costs more in line.

You can do this by joining a *Local Cost Group* sponsored by the Gray Iron Founders' Society. Progressive gray iron foundries are associated through 19 of these groups which meet quarterly in industry centers throughout the United States.

Regional cost consultants manage respective area cost groups and serve as your confidential C. P. A. on costs. For full information, check the coupon below and mail it to the Society immediately.

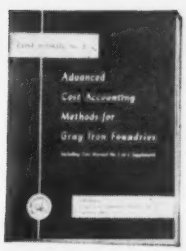
HOW TO OBTAIN ACCURATE JOB COSTS

Job costs for operating a sandslinger, roll-over, core-blower and other modern equipment must be figured differently than when these were hand operations. If you are still using simplified job cost methods after acquiring such modern equipment, your cost figures may be inaccurate.

To learn the most advanced cost methods, you should have a copy of the new *Cost Manual No. 2*, developed by a committee of foundry executives. Every foundry, large or small, will discover in this practical manual an easy and accurate way of bringing accounting practice up to date. This new manual describes *advanced cost methods* for gray iron foundries, and it also includes as a supplement the *basic cost system* as presented in *Cost Manual No. 1*. The coupon below is for your convenience.

GRAY IRON FOUNDERS' SOCIETY

Make it better with Gray Iron



GRAY IRON FOUNDERS' SOCIETY, INC.
National City-East 6th Building, Cleveland 14, Ohio

Please send us:

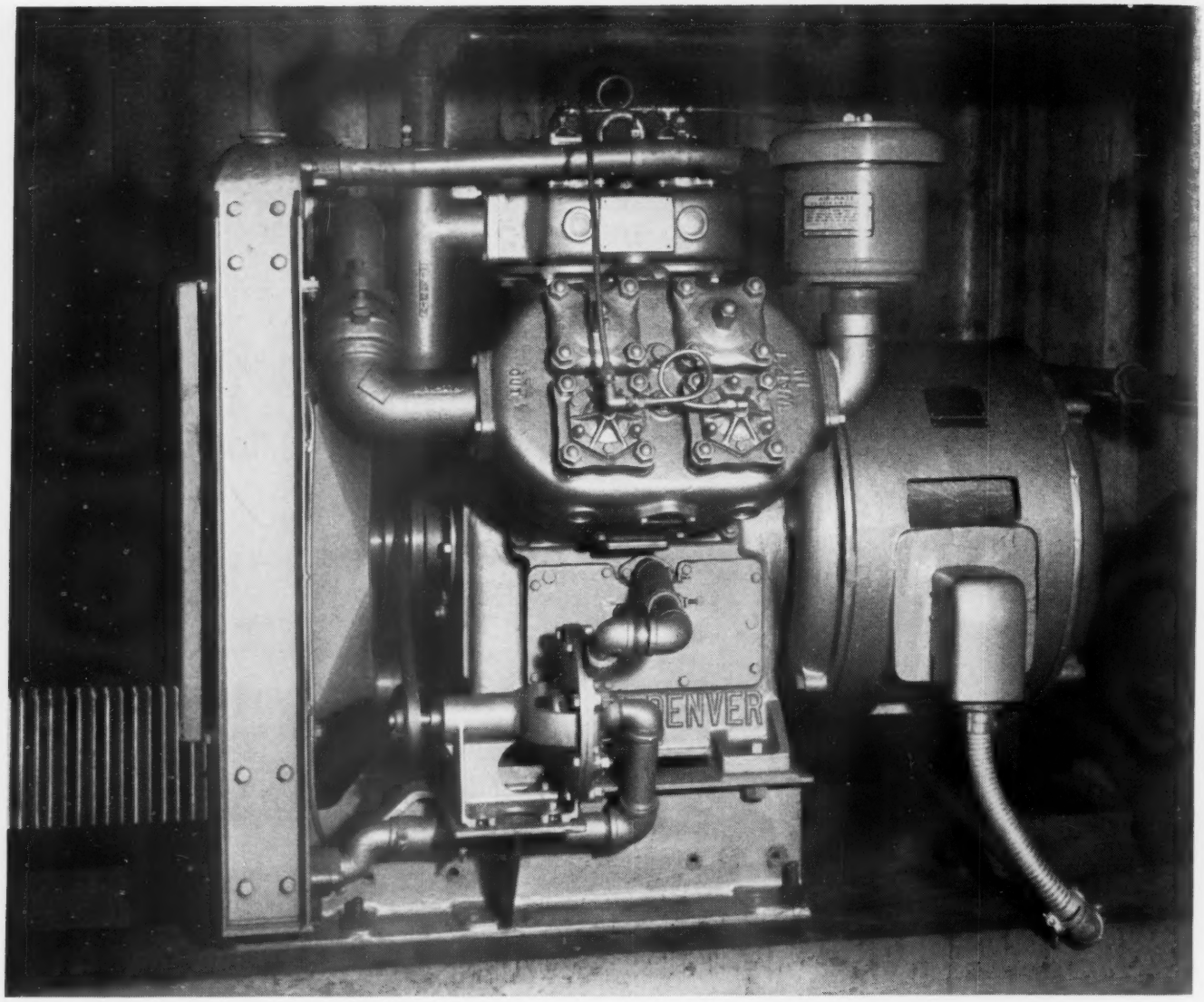
- ☐ Literature on *Cost Manual No. 2*.
- ☐ Full information about the nearest Local Cost Group.
- ☐ Complete facts about other Society services.

Name _____

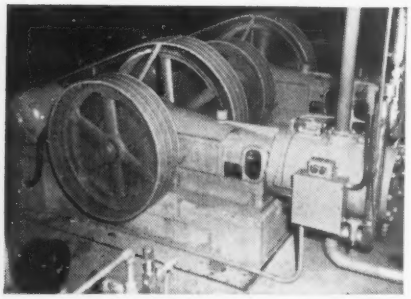
Address _____

Title _____

Company _____



You save five important ways with the Gardner-Denver WB Compressor



Put these Gardner-Denver RX Compressors on 24-hour service—and forget about air stoppage. Send for bulletin HAC-40.

1. Seven compact sizes save floor space.
2. Ready to hook up and go—inexpensive foundation requirements.
3. Combination radiator-intercooler saves cooling water where it is hard to come by.
4. High efficiency design saves power costs.
5. And a WB seldom requires more than routine maintenance.

Send for bulletin WB-10

GARDNER-DENVER Since 1859

KELLER TOOLS

GARDNER-DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING PETROLEUM AND GENERAL INDUSTRY

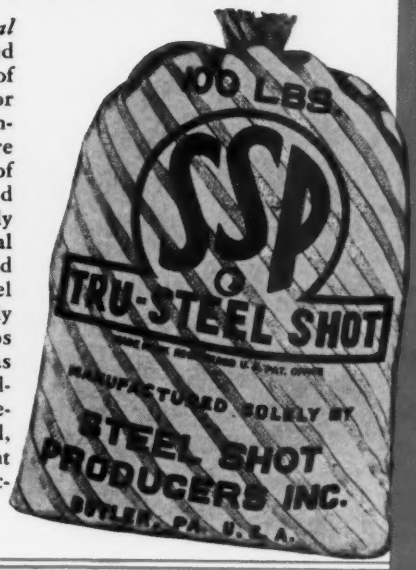
Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

4 ORIGINALS—the leading abrasives for blast cleaning!

Four great names in metal abrasives stand alone in dominant leadership—all products of continuing research in development of better abrasives by America's pioneer maker of metal abrasives, Pittsburgh Crushed Steel Company and subsidiaries.

TRU-STEEL SHOT

Tru-Steel is the *original* super-tough, heat-treated and drawn steel shot of tool steel quality, for those cleaning and peening applications where the savings potential of its performance and longer life can be fully utilized. In such typical jobs as steel sheet and strip blasting, Tru-Steel provides an absolutely *clean* surface. Many jobs where blast cleaning has heretofore been considered impossible are being done with Tru-Steel, resulting in important savings in big-production blast cleaning.



MALLEABRASIVE®*

Malleabrasive is the *original* patented malleablized metal abrasive and the most widely used premium abrasive. Intermediately priced, Malleabrasive provides lower overall blast cleaning costs in more varying types of blast cleaning conditions than any other metal abrasive. Malleabrasive has been widely imitated, but genuine Malleabrasive is manufactured under the complete Malleabrasive process used by our organization only, providing Malleabrasive's unique and distinctive metallurgical structure.

*U.S. Pat. #2184926 (other patents pending)

"SAMSON" SHOT—"ANGULAR" GRIT

These are the *original* metal abrasives, the oldest and most famous names in metal abrasives . . . the products that led the conversion of foundries from the use of sand to metal abrasives for blast cleaning at the turn of the century. These are not ordinary chilled iron abrasives, but products of modern, unequalled manufacturing facilities, geared for production of metallurgically controlled abrasives of uniform chemistry, hardness and toughness. For operations requiring chilled iron abrasives, these are the *top leaders.*

LET US help you determine the type of metal abrasive most efficient and economical for your needs. 5 manufacturing plants, 13 distributing points, 33 sales and service branches at your disposal. Write us.

PITTSBURGH CRUSHED STEEL CO., Arsenal Station, Pittsburgh 1, Pa.

AS PARTNERS IN YOUR PROGRESS

...we have great confidence in you – our customers!

It is because we have this confidence in you that we substantially increased the production capacity of our Niagara Falls, N. Y. and Morganton, N. C. plants.

It is because of this confidence that we are constantly engaged in far-reaching research and developmental activities to insure your steadily increasing acceptance of our products in the years to come.

And it is because of this confidence in you that we look forward to still greater rewards from our partnership in your progress — to the degree that they are merited through the dependability of our products and the alertness of our service.

ELECTRODE GLC DIVISION

Great Lakes Carbon Corporation

GRAPHITE ELECTRODES, ANODES, MOLDS and SPECIALTIES

ADMINISTRATIVE OFFICE: 18 East 48th Street, New York 17, N. Y.
PLANTS: Niagara Falls, N. Y., Morganton, N. C.
OTHER OFFICES: Niagara Falls, N. Y., Oak Park, Ill., Pittsburgh, Pa.

Sales Agents in Other Countries: Great Northern Carbon & Chemical Co., Ltd., Montreal;
Overseas Carbon & Coke Company, Inc., Geneva; Great Eastern Carbon & Chemical Co., Inc., Chiyoda-Ku, Tokyo.

2¼-yd. MICHIGAN 175A carries heaping bucket load of ammonium sulfite . . .

This big POWERHOUSE handles bigger jobs cheaper!

Check the specs of the MICHIGAN* 175A:

BUCKET CAPACITY..... 2¼ yds.
WEIGHT..... 24,100 lbs.
LIFTING CAPACITY..... 15,000 lbs.
SPEED..Up to 27 mph, Forward and Reverse
HORSEPOWER..... 133 Diesel, 126 Gas, 165 Supercharged

Don't look for "comparative" data on the MICHIGAN 175A—there is *no machine comparable*. This big bruiser is nearly 50% bigger than the next closest machine on the market. From flywheel to bucket, the 175A is built to do bigger, heavier jobs—jobs that no other rubber-tired machine can handle.

Better traction and flotation With the MICHIGAN's exclusive power train—300% torque multiplication, power shift transmission (no engine clutch) and planetary wheel axles—you get a shockless flow of power right down to the ground. There's no surge, no wind-up in the axle shaft, no wild wheel-spin. The operator has feather-touch control over his wheels; in weak soil conditions or mud, he can ease off or step up the power to keep from digging in. With this kind of smooth power transmission, you get the full advantage of the MICHIGAN's extra weight and power—you dig material *out*, you don't dig the machine *in*.

Hydraulic power does the work In spite of its size and power, the MICHIGAN 175A is easier to operate than most machines one-third its size. Hydraulic power does all the real work: power steering, 4-wheel power brakes, power-shifting with two simple levers on the steering column, no clutch pedal.

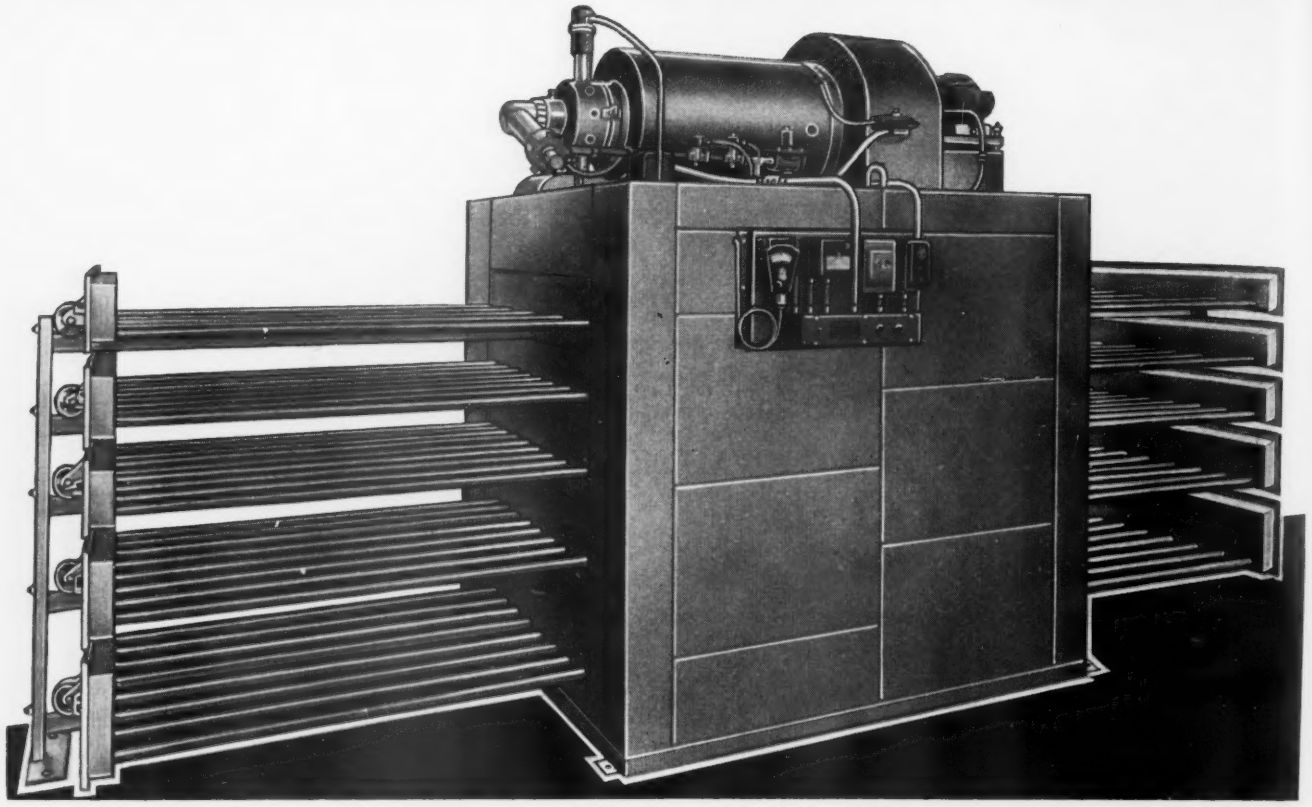
See it in action! We'll prove that the MICHIGAN is in a class by itself in the Tractor Shovel field: your local MICHIGAN distributor will arrange a demonstration—on your own job, if you wish. Or write for 12-page Tractor Shovel booklet containing explanation and cutaway drawings of the MICHIGAN power train. Any MICHIGAN is available on a low-cost Lease Plan—ask for brochure which explains how you can use it.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
442 Second Street
Benton Harbor 30, Michigan
Phone WA 6-6184

*A Trademark of Clark Equipment Company

PORBECK RECIRCULATING DRAWER TYPE CORE OVENS



ENGINEERS • DESIGNERS AND MANUFACTURERS

PERFORMANCE:—

This oven will give top performance by baking uniform cores year after year with a minimum of maintenance.

ECONOMY:—

Low fuel operating cost combined with high volume production make Porbeck ovens pay big dividends.

LOW IN COST:—

Only in Porbeck ovens do you get drawer types made of heavy materials and rigid construction—at a remarkably low price. Volume production of standard sizes make this possible.

SO—

If you want PERFORMANCE—ECONOMY—and more for your investment dollar, Look to Porbeck, Manufacturers of a complete line of industrial ovens.

WRITE FOR BULLETIN

Sold by leading foundry supply houses throughout the United States.

Serving Industry Since 1894

PORBECK MFG. CO. 2600 N. 9th STR. ST. LOUIS 6, MO.

dag
DISPERSIONS®

OBERDORFER FOUNDRIES, INC. uses 'dag' dispersions in more than 15 operations

To speed the production of non-ferrous castings for jet engine frames and other complex parts, Oberdorfer Foundries, Inc., Syracuse, New York, uses **'dag'** Colloidal Graphite in many ways. For example:

. . . As a coating for cast iron and steel chills, the refractory *dry lubricating film* prevents aluminum from fusing to the chills.

. . . As an ingot-mold wash, a **'dag'** dispersion notably increases mold life and greatly improves surface qualities of the castings.

. . . As a chilling agent, **'dag'** Colloidal Graphite hastens solidification of heavy sections in permanent-mold castings.

Oberdorfer relies on **'dag'** Colloidal Graphite because it is highly refractory and will tolerate any temperature met in the foundry. Coatings of **'dag'** dispersions do not adsorb harmful gases, are chemically inert, promote rapid heat transfer and chilling, and help to maintain the high quality production for which Oberdorfer is famous.

To learn how this versatile material can help you produce finer castings, write for our free booklets on general applications of **'dag'** dispersions in the foundry and **'dag'** Colloidal Graphite used as a parting compound. Write for Bulletins No. 425-U11 and No. 427-U11.

Dispersions of molybdenum disulfide are available in various carriers. We are also equipped to do custom dispersing of solids in a wide variety of carriers.

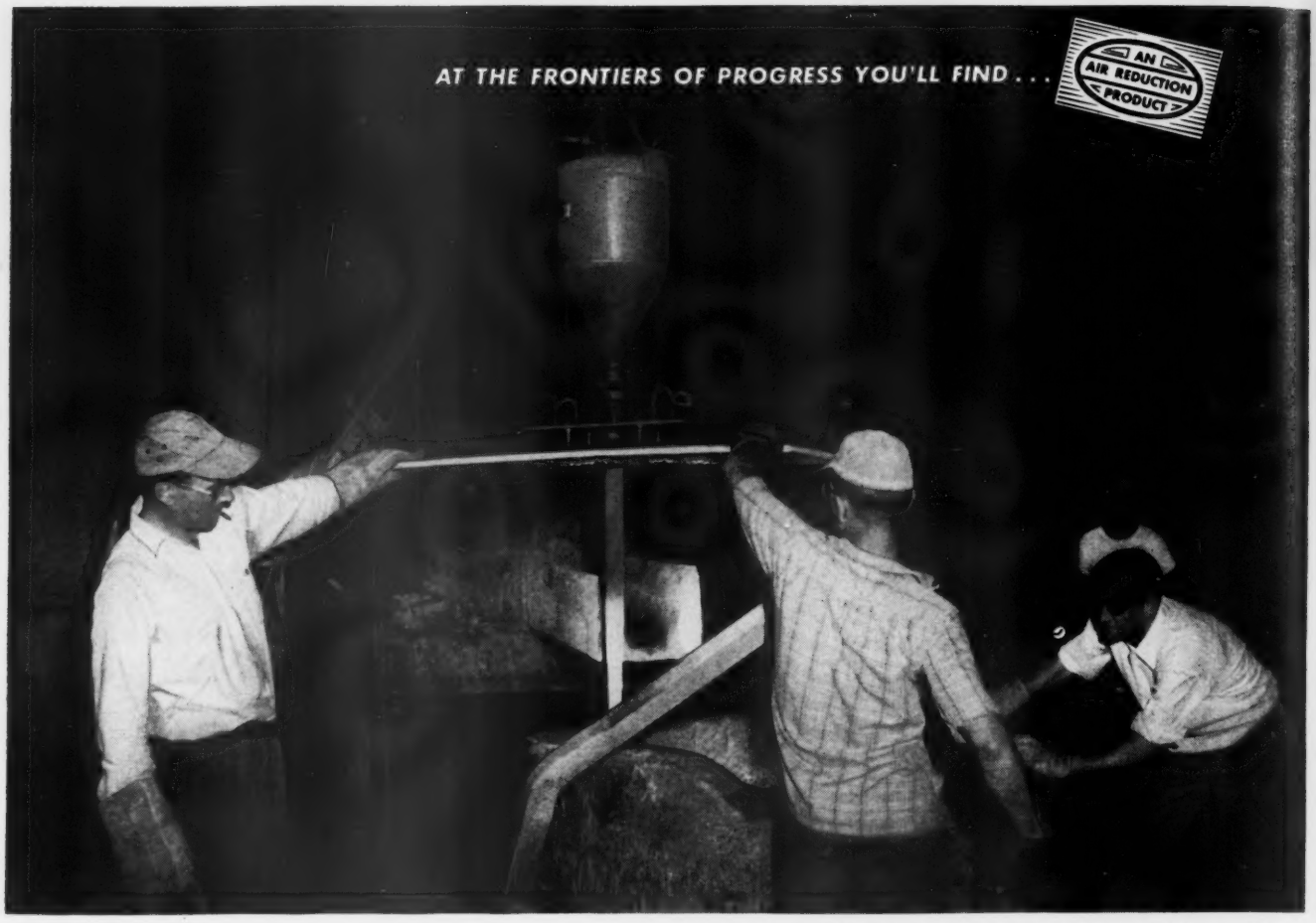
ACHESON COLLOIDS COMPANY

PORT HURON, MICHIGAN

. . . also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

use 'dag' dry films for trouble-free lubrication

UNITS OF ACHESON INDUSTRIES



Lowering of Airco batch feeder into ladle for injection of calcium carbide.

Now! Gray-Iron foundries can reduce cost of producing ductile iron

INEXPENSIVE AIRCO CARBIDE INJECTION PROCESS CAN SAVE UP TO 50% BY REDUCING NEED FOR EXPENSIVE ALLOYS

Calcium carbide, dry nitrogen and a simple, inexpensive batch feeder are all that gray iron foundries need to reduce production costs of ductile iron, thanks to a new process developed by Airco.

When finely ground Airco No. 20 Special Carbide is injected with nitrogen into molten iron, the desulphurization is so uniform and efficient that ductile iron can be produced from acid cupola iron after carbide treatment. The low sulphur content of carbide treated irons—as low as 0.01% means the quantity of expensive alloys may be reduced with no sacrifice of mechanical qualities. Users of the new process have reported substantial savings by substituting less expensive alloys. Another feature of the process is its flexibility, since by using carbide treatment the same cupola charge may be used for producing a variety of grades of iron.

The new calcium carbide injection process is the result of Airco Technical Service's continuing effort to find new, profitable techniques for customers. If you have a cutting, welding or metallurgical problem, why not ask Airco to help you? Write to your nearest Airco office.

AIRCO®

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated, with offices and dealers in most principal cities

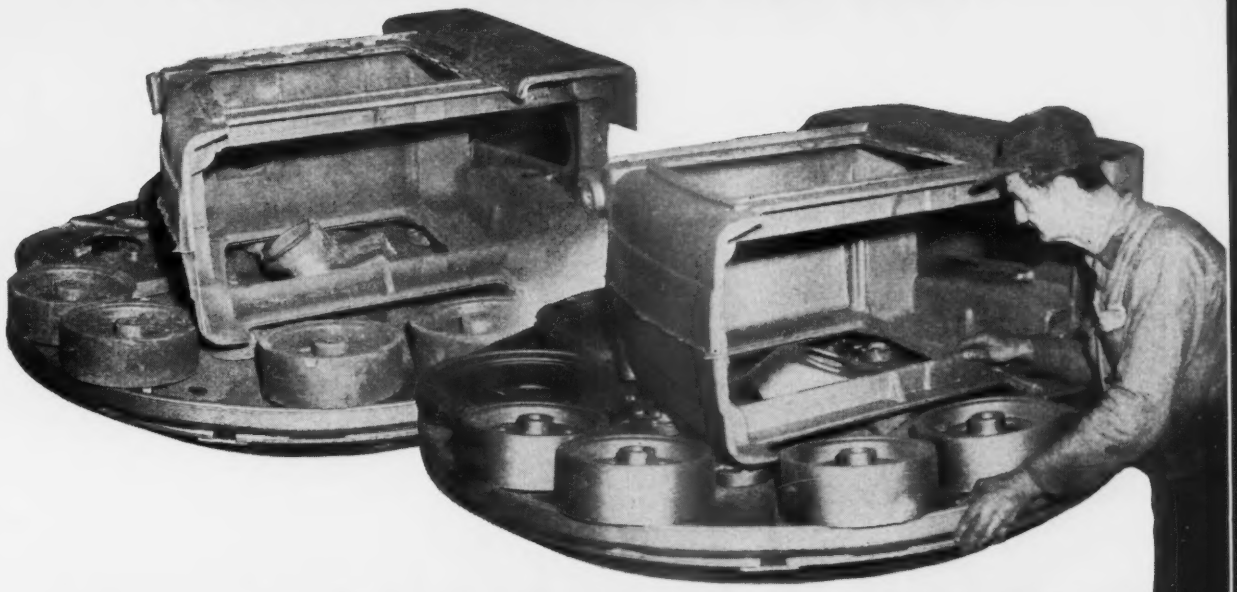
Air Reduction Sales Company
Air Reduction Pacific Company
Represented internationally by
Airco Company International
Foreign Subsidiaries:
Air Reduction Canada Limited
Cuban Air Products Corporation

Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** — industrial gases, welding and cutting equipment, and acetylenic chemicals • **PURECO** — carbon dioxide, liquid-solid ("DRY-ICE") • **OHIO** — medical gases and hospital equipment • **NATIONAL CARBIDE** — pipeline acetylene and calcium carbide • **COLTON** — polyvinyl-acetates,—alcohols, and other synthetic resins.

CLEANING TIME CUT

from 5½ hours to 6 minutes

with the WHEELABRATOR®



Drastic reductions in cleaning time and costs are the obvious results of the high speed performance of the airless Wheelabrator. At a Wisconsin gray iron foundry, for example, time required for cleaning the 640 lb. casting, illustrated above, was slashed from 5½ hours by tumbling to just six minutes with the installation of a Wheelabrator Swing Table. Through such spectacular time savings, a 75% reduction in cleaning time was effected for their entire production.

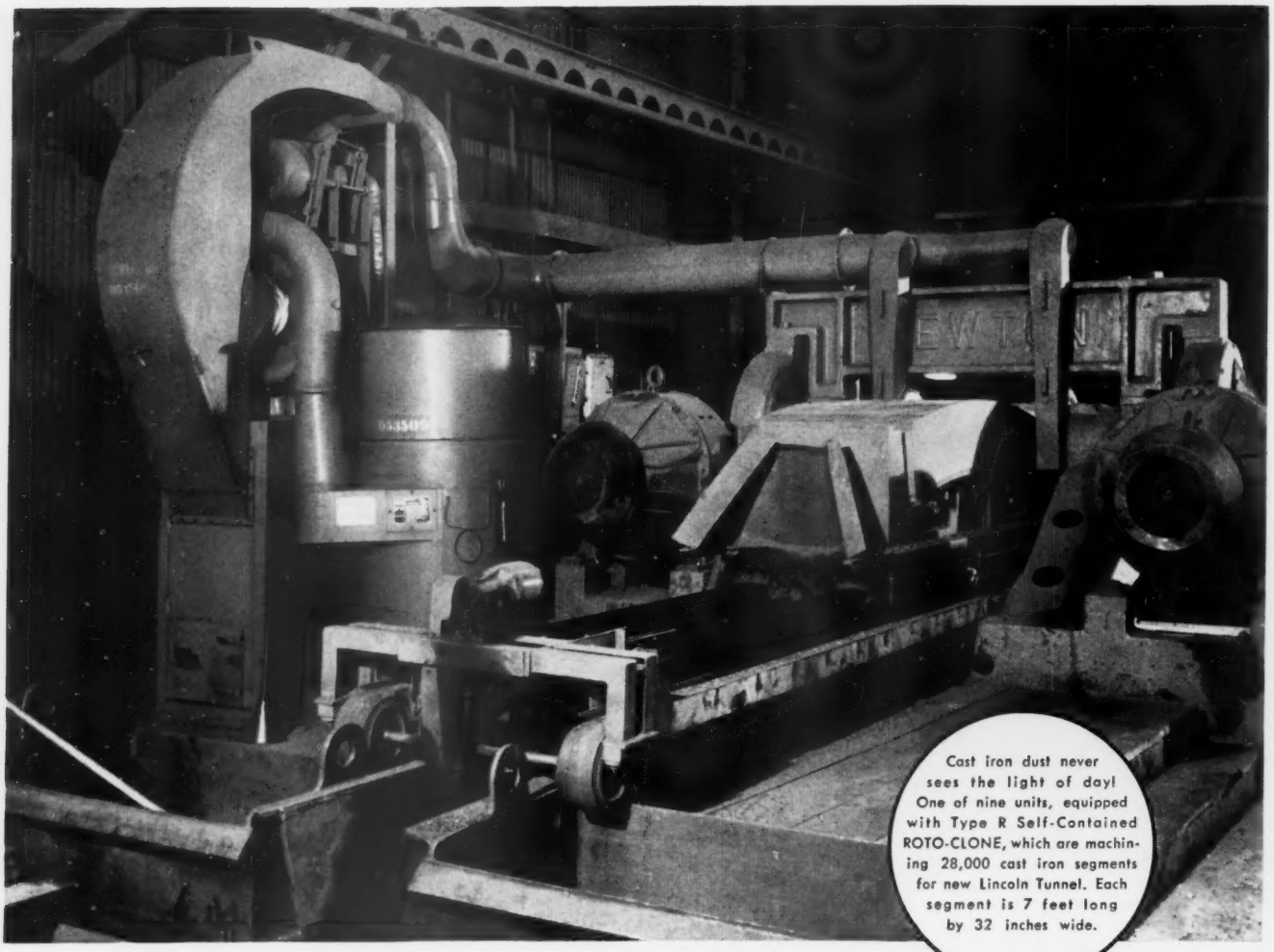
Other equally important benefits resulted: Breakage was eliminated. Chipping and grinding operations were facilitated due to the sand and scale-free surfaces of the Wheelabrated castings, and foundry efficiency improved.

Do you have a cleaning problem that could benefit from Wheelabrator's cost-and-time-saving performance? Let one of the nearby Wheelabrator engineers give you the facts first hand. Write today for the complete story — Ask for Catalog 74C.

American WHEELABRATOR®

World's largest builders of airless blast equipment

AMERICAN WHEELABRATOR & EQUIPMENT CORP., 505 Byrkit St., Mishawaka, Indiana



Cast iron dust never sees the light of day! One of nine units, equipped with Type R Self-Contained ROTO-CLONE, which are machining 28,000 cast iron segments for new Lincoln Tunnel. Each segment is 7 feet long by 32 inches wide.

Even a Cast Iron Highway Has Its Dust Problems

LINCOLN TUNNEL'S third and newest traffic tube under the Hudson River will literally be a cast iron highway—a mile-long highway formed by placing 2000 giant cast iron rings side by side. Each ring, measuring 31′ in diameter by 32″ wide, consists of fourteen 7′ long segments which are assembled at the job site.

2000 x 14 = 28,000 segments that must be carefully machined to insure precision assembly. Here was a cast iron dust problem of "king size" proportions. But AAF had a ready-made solution, proved on scores of similar installations—the Model R Self-Contained ROTO-CLONE.

Now, cast iron dust is always "under wraps". Through integrated control, the Model R successively removes (1) the chips in a precleaner, (2) then the coarser dust particles with a Type D ROTO-CLONE, and (3) finally the fine float cast iron and graphite with a Cycoil Oil Bath Scrubber. Final result—this air, when returned to the work room, is cleaner than that of the surrounding area.

AAF's 23 years of dust control experience penetrates every industry—covers thousands of successful applications. That's why the local AAF representative is your logical point of contact on all problems of dust control. Call or write him now.

AAF herman nelson

American Air Filter

COMPANY, INC.

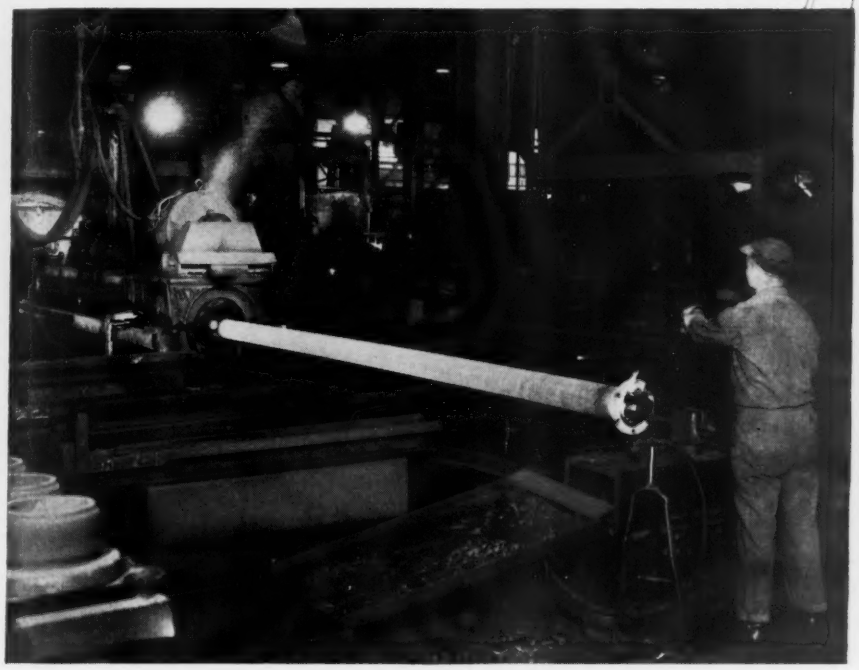
American Air Filter of Canada, Ltd., Montreal, P. Q. • 266 Central Avenue, Louisville 8, Kentucky

Tough, enduring

CLOW Water Pipe

demands

top quality Pig Iron



IT'S no longer news when a cast iron water line is found to be in almost perfect condition after a century or more of service underground. No other material is able to do the job so well, so long. To achieve this durability, one of the leading makers of cast iron pipe, James B. Clow & Sons, employs modern centrifugal casting facilities and high quality pig iron. The company's Coshocton, Ohio plant relies upon the uniform composition and dependable quality of Neville Pig Iron. • If you have a special casting problem, there's a good chance we can assist you. *Why not write or call today?*

Neville Pig Iron and Neville Coke for the Foundry Trade

W&D 5036

PIG IRON DIVISION

PITTSBURGH COKE & CHEMICAL CO.

Grant Building • Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Closer Control

OF COSTS AND MELT

with Whiting-Thermo Hot Blast System

Closer cost and quality control at a smaller investment—these are the basic advantages of the Whiting-Thermo Hot Blast System. Employing a separately fired air heater, a Whiting-Thermo Hot Blast System costs less initially, requires less supporting structure, takes up less space and needs less maintenance than any other system for preheating blast air.

Air blast temperatures up to 1000° F. can be precisely controlled because the fuel, either gas or oil, is of known quantity and quality. Almost instant pre-heated air is available to provide faster ignition, cleaner tuyeres, greater savings on coke, silicon and fluxing agents.

Whiting also manufactures the Griffin Hot Blast System in which the blast is preheated by utilizing the waste sensible heat and the latent heat present in carbon monoxide gases that usually pass up the cupola stack. Only a small amount of outside fuel is necessary for a pilot light to ignite the waste gases. Preheat temperatures range up to 600° F. A modified system of the Griffin closes off the stack entirely and all gases are drawn through the preheating system. This system, with an efficient dust collector, may be used to satisfy the most rigid dust codes.

Every foundry has different needs, and Whiting, with its more than 70 years of experience in building foundry equipment, can help solve *your* melting problems . . . help you decide which system is best for you. See how you can control costs and quality with the combination of this experience coupled with equipment engineered to give long, trouble-free performance. Call in your Whiting man for a full report!

WHITING CORPORATION

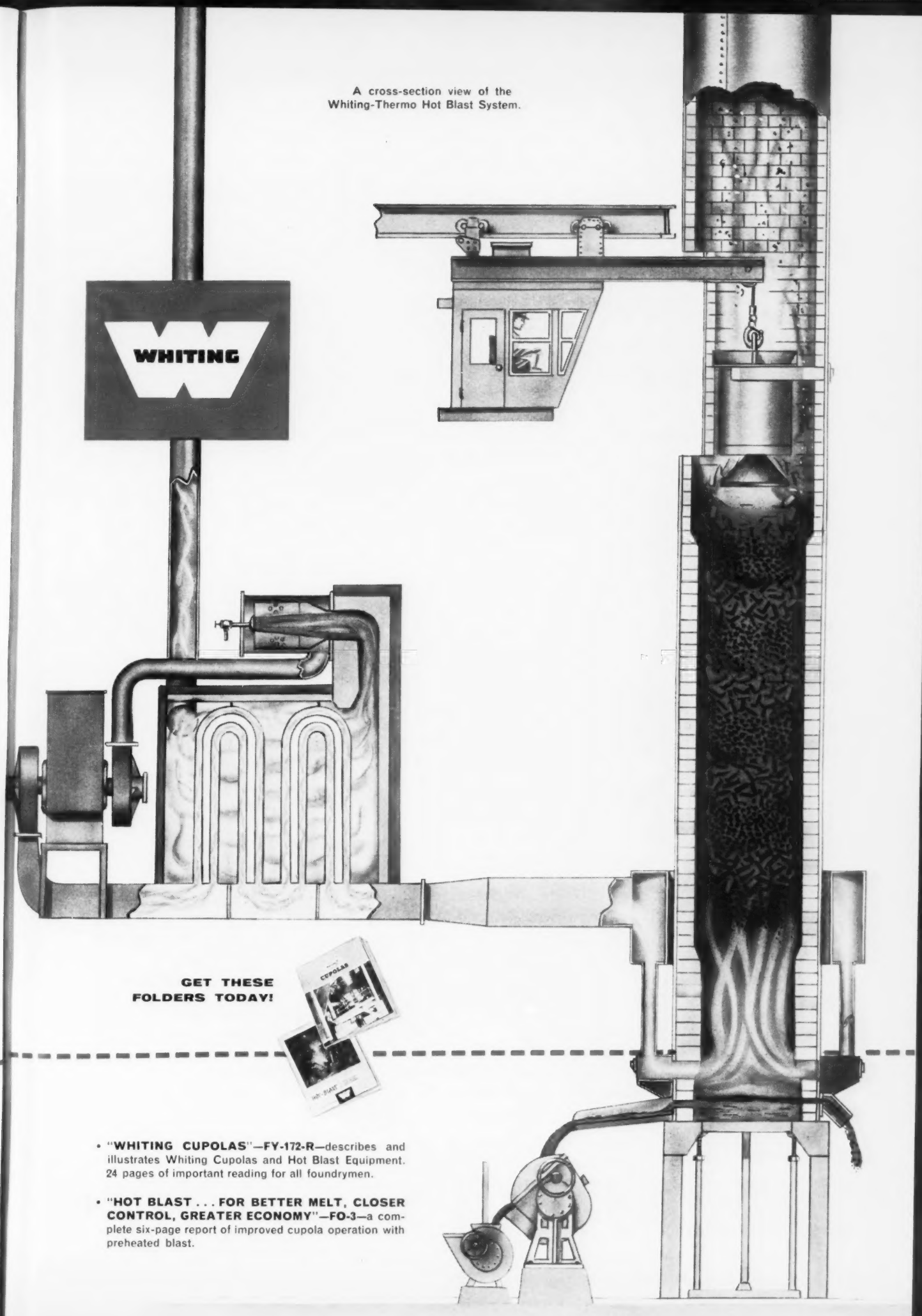
15607 Lathrop Avenue, Harvey, Illinois

MEMBER FEMA

WHITING FOUNDRY PRODUCTS INCLUDE:

Cupolas • Cupola Spark Suppressors • Cupola Hot Blast Equipment • Cupola Blast Moisture Control Equipment • Cupola Charging Systems • Cradle Furnaces • Hot Metal Mixers • Duplex Melting Systems • Air Furnaces • Electric Melting Furnaces • Ladles • Ladle Handlers • Ladle Preheaters • Tumbling Mills • Annealing Ovens • Transfer Cars • Pulverizers • Pulverized Coal Firing Systems • Turntables • Electric Traveling Cranes • Trackmobile • Trambeam Overhead Handling Systems.

A cross-section view of the
Whiting-Thermo Hot Blast System.

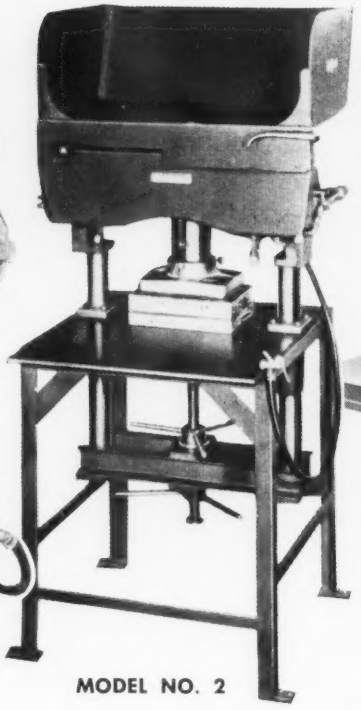


GET THESE FOLDERS TODAY!

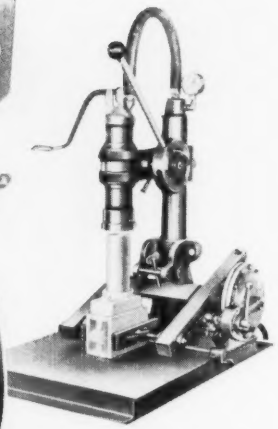
- **"WHITING CUPOLAS"—FY-172-R**—describes and illustrates Whiting Cupolas and Hot Blast Equipment. 24 pages of important reading for all foundrymen.
- **"HOT BLAST . . . FOR BETTER MELT, CLOSER CONTROL, GREATER ECONOMY"—FO-3**—a complete six-page report of improved cupola operation with preheated blast.

Redford CORE BLOWERS

MODEL NO. 4
(Also available with draw cylinder)



MODEL NO. 2



BENCH TYPE

Proven performance — simplicity — flexibility — power — speed.

For 10 years now Redford has kept pace with progress in the foundry. From the first bench type to the new No. 4 . . . all Redford Core Blowers are designed to meet your demand for better cores at lower cost, regardless of production requirements.

For complete information, write for our detailed literature.

Redford IRON & EQUIPMENT CO.

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3 MARKS OF MERIT

A Promise of Quality

UNITED

And Two Sure Winners

A RELEASE AGENT

Unilease

"98"

Bonding agents for sand can be clean in one mix and not too clean in another. Resin binders particularly need attention in this respect and for these problem jobs United offers **Unilease.** A little added to the sand mix can make a wonderful difference in the clean working qualities of sand and **Unilease** will stand thinning with kerosene so the cost is low. The first application will put a shine on the mixer blades and help keep the core boxes in a cleaner condition. You get a real release with **Unilease.** Try it on your toughest job and see how much time it can save in the core room.

Liquid Parting

"X"

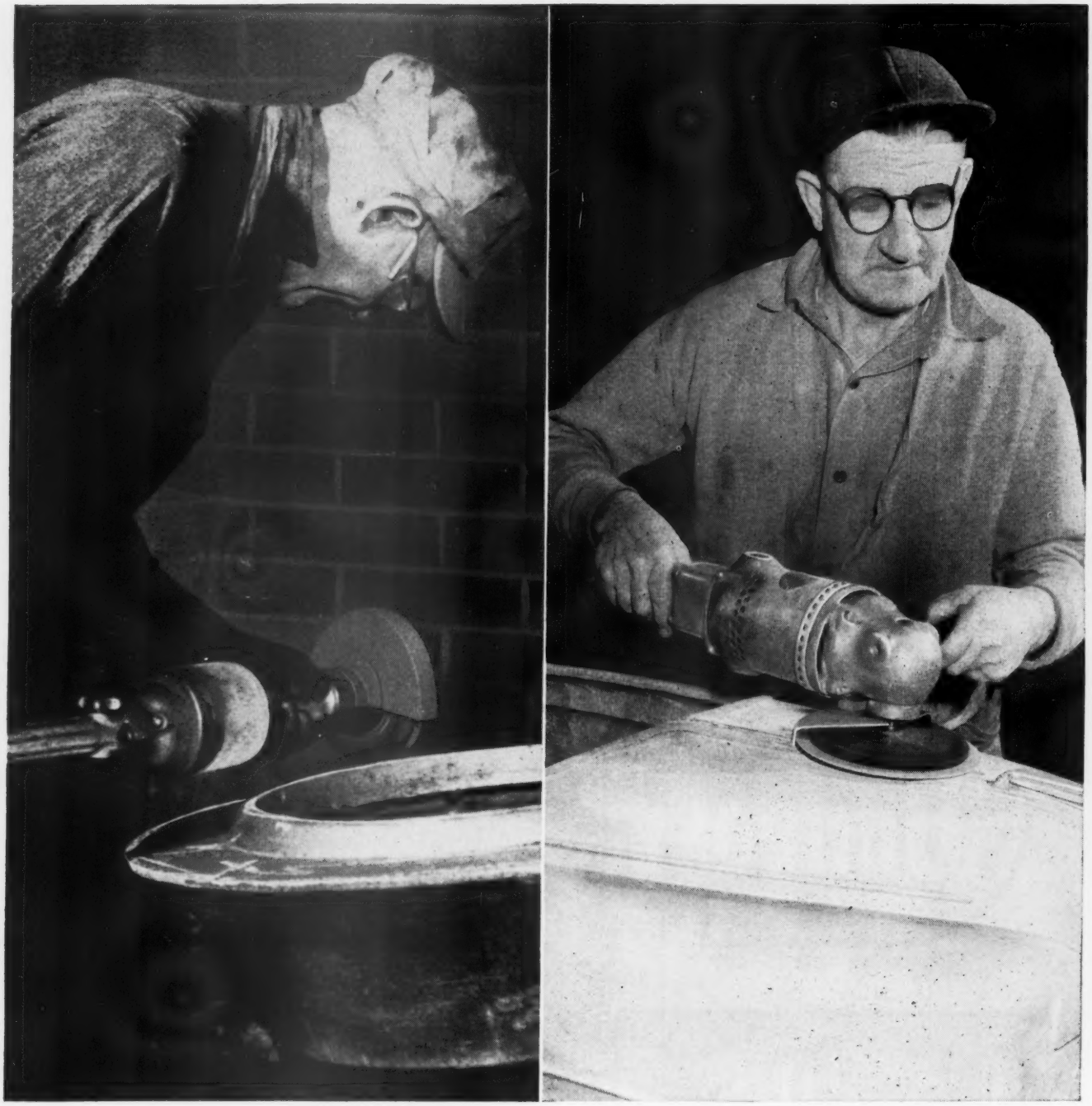
Liquid Parting is another aid for speeding production in the core room. Core boxes that are first cleaned and then wiped with **Liquid Parting** will stay clean for a long time. A little does the job. It can be applied sparingly and just an occasional going over will keep the core boxes in top condition for fast core thru-put. Good housekeeping pays off. Cleaner boxes mean smoother cores and a faster output for each core maker. You will want to know more about both of these products. Write us for further details.

UNITED

A new book covering the full line of United Core Binders is ready and will be sent on request.

UNITED OIL MFG. COMPANY

1429 WALNUT STREET, ERIE, PA.



Reducing welds with straight wheel

Blending welds with depressed center wheel

CUT COSTS *on every*

YOUR CARBORUNDUM DISTRIBUTOR OR SALESMAN will show you which of these products is best for each of your operations...and why! Call him today—he's listed in the yellow pages of your phone book under "Abrasives" or "Grinding Wheels." Years of experience, unbiased counsel, complete stocks of abrasives and fast, dependable service make him your one source for help on every grinding and finishing problem. Or, if you prefer, write to The Carborundum Company, Dept. F 81-54, Niagara Falls, New York. In Canada: Canadian Carborundum Company, Ltd., Niagara Falls, Ontario.

Rough grinding with cup wheel

Cleaning casting with cone wheel

PORTABLE GRINDING *job!*

Are *you* getting maximum production at lowest possible cost from your portable grinding operations? There's ONE way to be sure—use the proper abrasive product by Carborundum for every type of portable grinding machine—air or electric—in your shop.

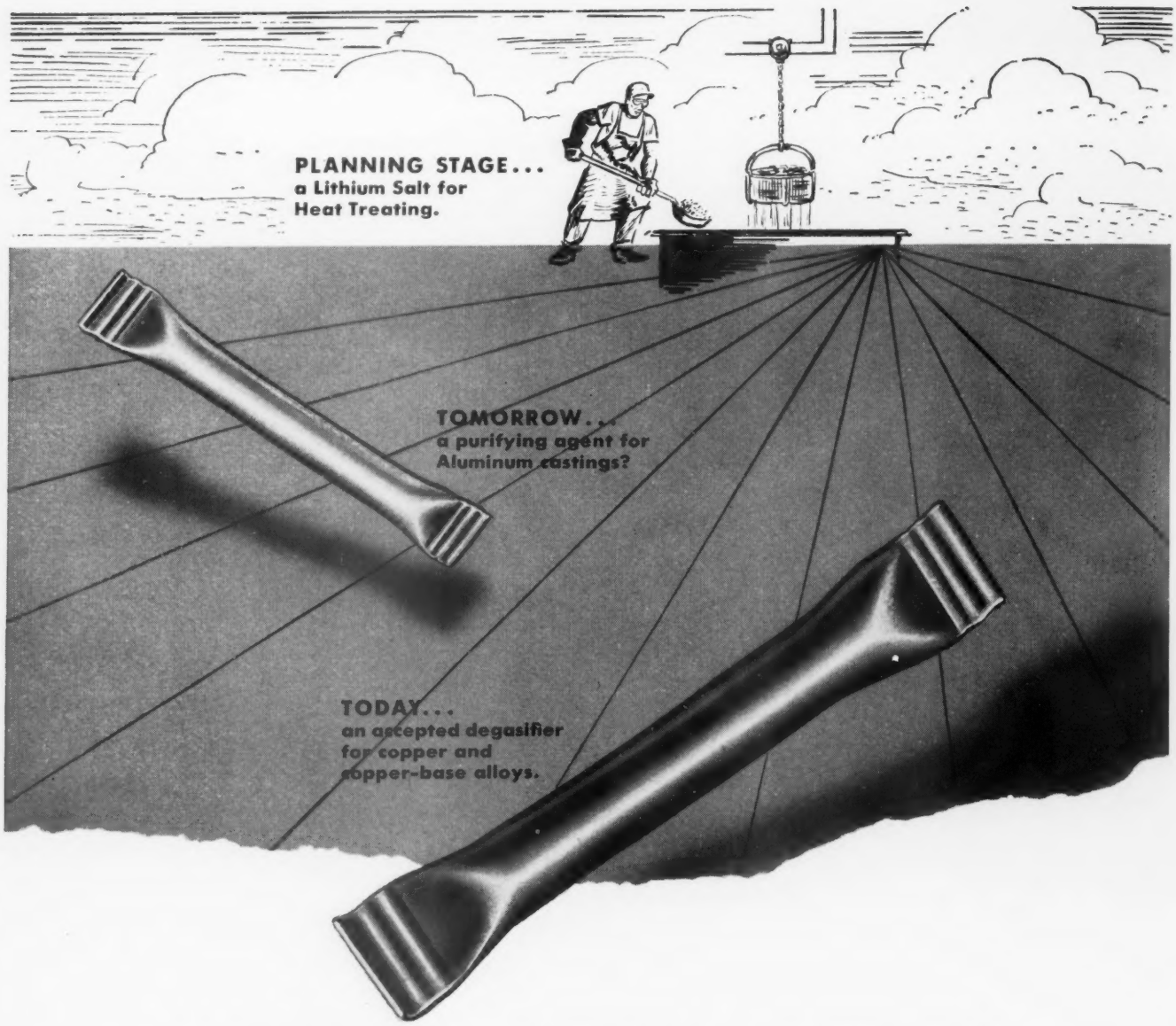
YOUR WIDEST CHOICE of abrasives by CARBORUNDUM assures you of the *one* best suited to every metalworking operation, whether you're rough grinding or snagging...weld grinding or deburring...smoothing edges, finishing or polishing. Choose from *seven* different types of wheels, including straight wheels, cups, rubber-bushed wheels, mounted wheels or versatile MX® and CARBOFLEX products.

CARBORUNDUM

REGISTERED TRADE MARK

...continually putting more **SENSE** *in your abrasive* **DOLLAR**

81-54



LITHIUM METALLURGY

Lithium has been long established in the nonferrous foundry industry as a degasifier, deoxidizer, desulfurizer and general purifying agent. The small amounts required put both the economics and technique within the limits of everyday nonferrous foundry operation. Now, tests under certain production conditions indicate that Lithium is equally valuable as a degasifier for aluminum castings. Still in the realm of research, Lithium Salts hold vast promise of valuable benefits for low temperature heat treating baths. Why don't you look into this miracle element? This revolutionary technique is within *your* reach. Write for the details.

... trends ahead in industrial applications for Lithium

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MINES: Keystone, Custer, Hill City, South Dakota • Bessemer City, North Carolina • Cat Lake, Manitoba • Amos Area, Quebec • BRANCH SALES OFFICES: New York • Chicago
CHEMICAL PLANTS: St. Louis Park, Minnesota • Bessemer City, North Carolina • RESEARCH LABORATORY: St. Louis Park, Minnesota

You'll increase cleaning room capacity . . . move castings to machine shop and shipping faster than ever before by using MONO-KLEEN Mineral Shot. ONE PASS over the surface and the job is done. There's no dusting to cloud workers vision and slow up work due to missed areas which must be reblasted later. MONO-KLEEN is a specially processed, non-metallic, spherical shot which cleans by impingement without abrading base metal. And it reduces wear on valves, hose and nozzles. Give us the word and we'll be glad to show you how you can get higher production at low cost.

SEND FOR BULLETIN with full data on its use in ferrous and non-ferrous foundries, types available; and packaging

BH

BALDWIN-HILL COMPANY

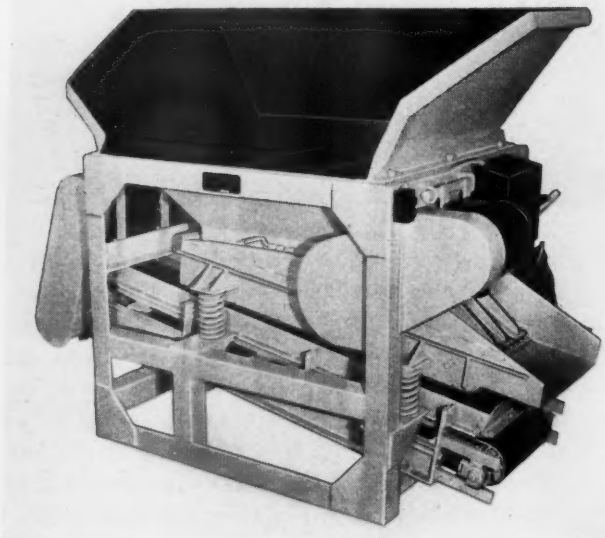
2206 BREUNIG AVENUE • TRENTON 2, NEW JERSEY

Kalamazoo, Michigan . . . Huntington, Indiana . . . Temple, Texas

(Advertisement)

FOUR MEN handle all of the molding operations for eight cope and drag stations on this above-floor B&P Rotomold unit at the American Foundry & Machine Co., Salt Lake City, Utah. Cope and drag patterns for each job are mounted on a single pattern board at eight roller conveyor stations on the Rotomold table. The Stationary Sandslinger rams any number of different jobs. *Write for full information to Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

Cost-Cutting Equipment in the News

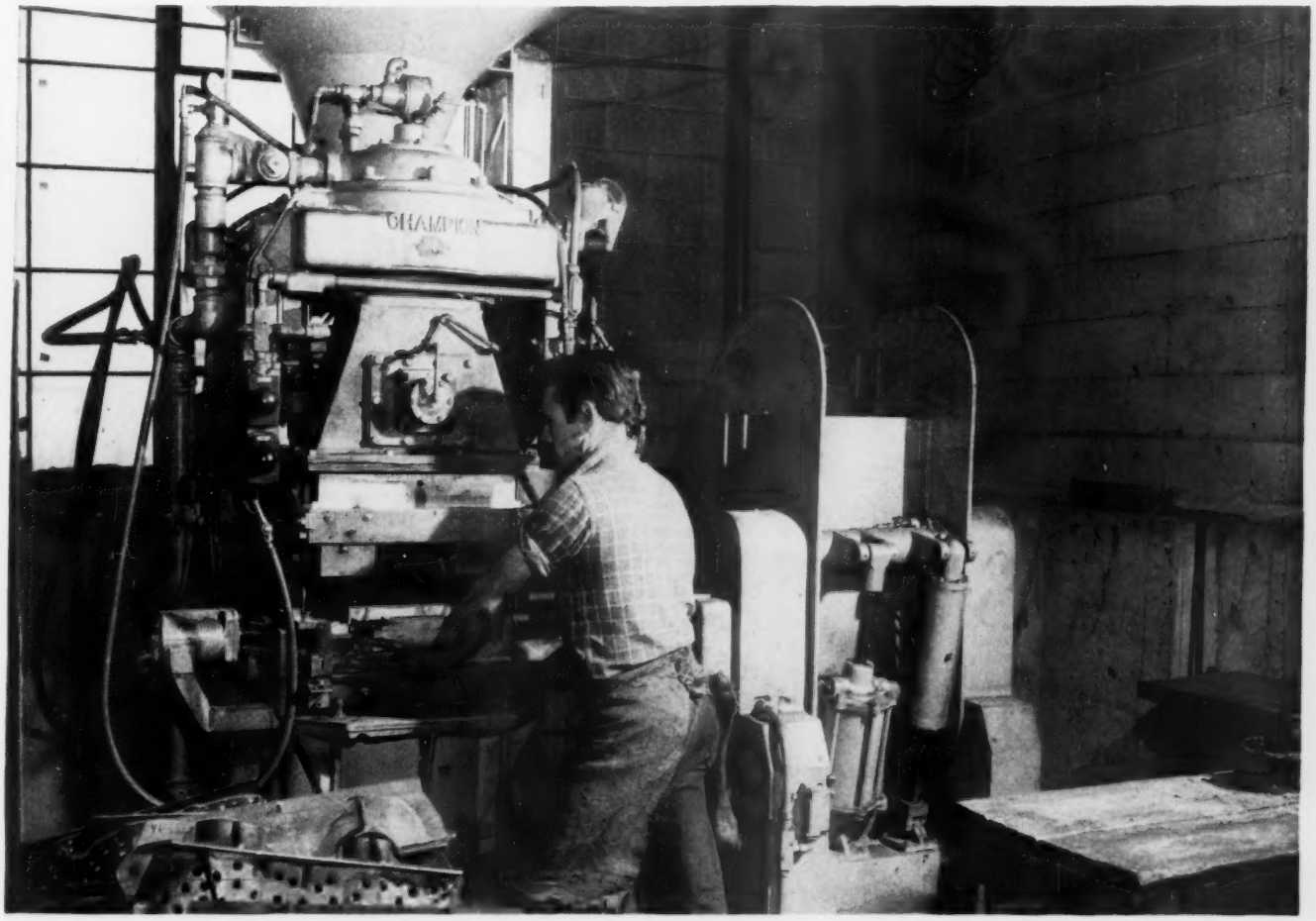


THE NEW ABOVE-FLOOR Model "60" Preparator, introduced by Beardsley & Piper, has greatly simplified the installation of Speedmullor-Preparator units. The installation costs of these complete sand conditioning and mulling units is now lower than ever. *Write to Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois for full information and prices.*

SMALL SIDE FLOOR WORK is handled efficiently at the Empire Pattern & Foundry Co., Tulsa, Oklahoma on two inexpensive J&J Portable Jolt-Squeezers. Rammed molds are set out on the floor for pouring. *Full information on J&J machines may be obtained by writing to Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

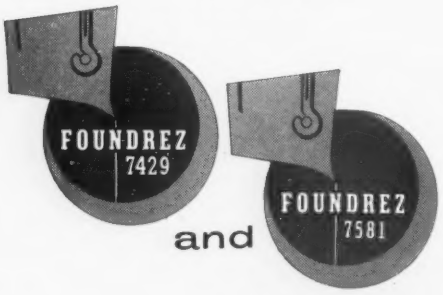
AUTOMATIC CONTROL of sand preparation has been further simplified and refined by a new Skiptrol device. Skiptrol, introduced by Beardsley & Piper, accurately controls loading of the Speedmullor skiphoist bucket. The diaphragm pressure switch located in the skiphoist bucket is shown here. Skiptrol is one of a complete line of automatic controls manufactured by B&P. These include Mulltrol, Mulltrolmatic, Blomatic, and Cormatic. *New detailed information on Skiptrol is obtainable from Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

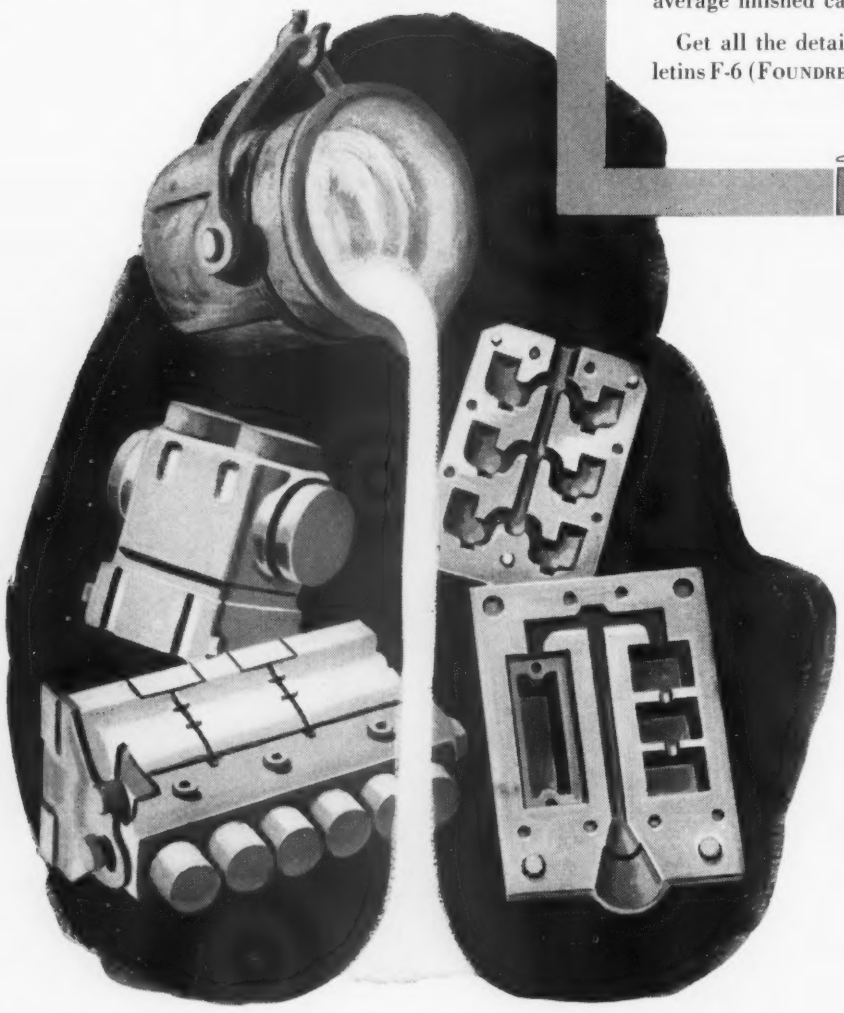
ALL OF THE CORES required for operations at the Belnap Manufacturing Co., Bridgeport, Connecticut are made from core sand thoroughly mulled in this Model 3½ Mulbaro. Belnap, manufacturers of an outstanding line of valves, depends on this Mulbaro, Speedmullors and a Swingslinger in their very efficient foundry. *For more information write to Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*



OVER 1400 forty pound double transmission cores are produced each day on this Champion Cormatic Unit at the Newnam Foundry, Kendallville, Indiana. The core sand for this exacting job is mulled in a Speedmullor. Cores blown on the Champion Blomatic Core Blower at left, are rolled over and drawn on the Rol-A-Cor Unit at right. *Champion Cormatic units are described in a new bulletin available from Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

For blowing smoother shells and cores, use RCI's liquid





• Now, thanks to FOUNDREZ 7429, you can get outstanding shell molds with a conventional blowing machine at a saving of 50 to 75% in resin. You cut overall shell mold production cost one half to one third with this liquid, water-soluble Reichhold phenolic resin. The shells equal or surpass the smoothness and dimensional accuracy of molds made by the "C" process, with its expensive special equipment.

Faster core blowing is the big reason for replacing core oils with RCI's other liquid, water-soluble, phenolic resin — FOUNDREZ 7581. It reduces the coring cycle from hours to minutes. Cores come out almost "pattern-smooth", making hand filing, mudding or core washing generally unnecessary. As the binder contains no cereal, there's less gassing and fewer rejects. Thus, FOUNDREZ 7581 saves you labor, which makes up about 35 to 40% of the total cost of the average finished casting.

Get all the details. Write for free Technical Bulletins F-6 (FOUNDREZ 7429) and F-5 (FOUNDREZ 7581).

RCI

Creative Chemistry . . .
Your Partner
in Progress

REICHHOLD

Synthetic Resins • Chemical Colors • Plasticizers • Phenol
Glycerine • Phthalic Anhydride • Maleic Anhydride • Sodium Sulfate
Sodium Sulfite • Pentaerythritol • Pentachlorophenol

REICHHOLD CHEMICALS, INC., RCI BUILDING, WHITE PLAINS, N. Y.

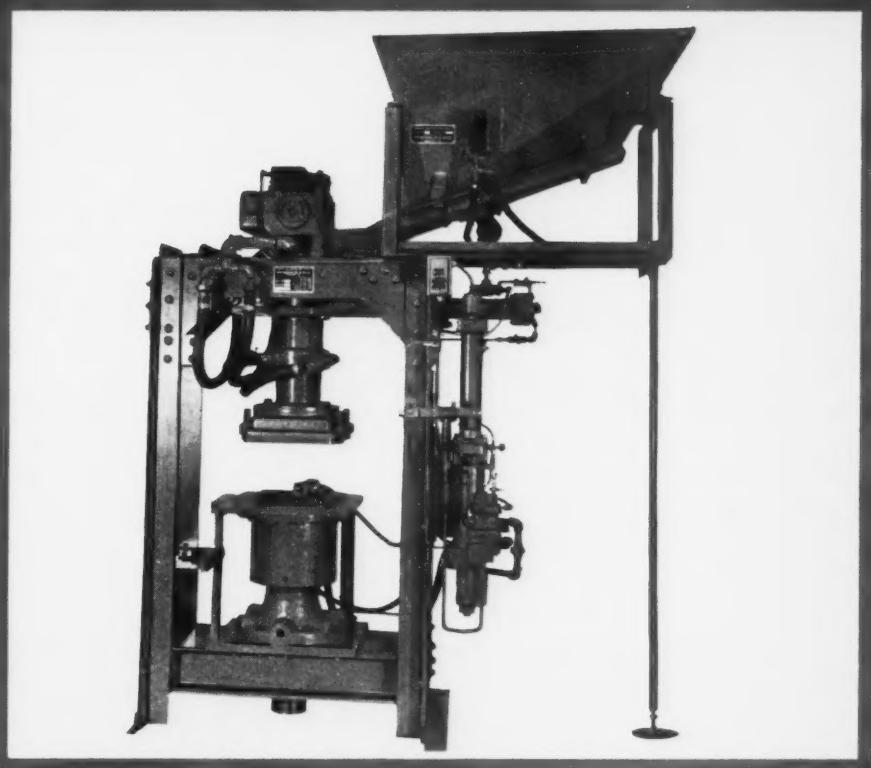
Our Sales Story is Simp

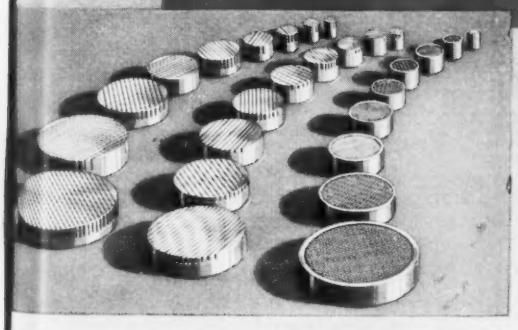
Demmler

Core Blowers hold the record for BOTH:

1. Highest Production

2. Lowest Maintenance





Demmler is the best source, too, for precision core box vents. Brass slotted, steel slotted and screen types for every application, including the new D-process.

For core blowers, remember this: You cannot buy faster production, lower maintenance than Demmler's. The reasons are 1. Demmler-simplified design with all parts easily accessible, and 2. More rugged Demmler construction. The Demmler 1E-OS, shown above with sand feeder, is typical. Just push starting lever for automatic, double production. Used with two drag halves, the operator never has to wait.

Write for literat

"Straddle Dump" in operation, Philip Greenberg Co., St. Paul, Minn.

loads itself—unloads itself
NOW . . . DUMPS ITSELF TOO

Here's the hottest development in the waste trade industry . . . a *one-man* scrap collection system!

1) Pick up scrap boxes at your customer's yard.
2) Transport them back to your yard at truck speeds.
3) DUMP THEM IMMEDIATELY!

In 5 seconds you pick up a 16,000 lb. load, drop it in 3 seconds. But here's the news! No waiting for a crane or extra crew—the new Ross Carrier "Straddle Dump" empties the scrap box immediately.

Here's more—you can save money by fabricating your own scrap boxes . . . operate efficiently with fewer containers, yet handle larger scrap capacities in shorter time. With the new "Straddle Dump" YOU can have a one-man scrap collection system . . . save money at the same time.

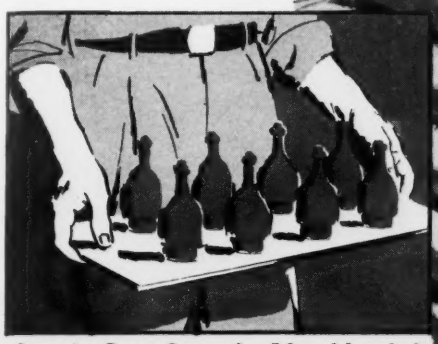
It's too good to pass up. Call your local Clark-Ross dealer right now. Get the full details on how the new Carrier "Straddle Dump" will speed your operations—save you money.

The Carrier gives over-the-road scrap hauling at truck speeds, self-dumps the load at destination. Here's a real profit-building system for your yard.

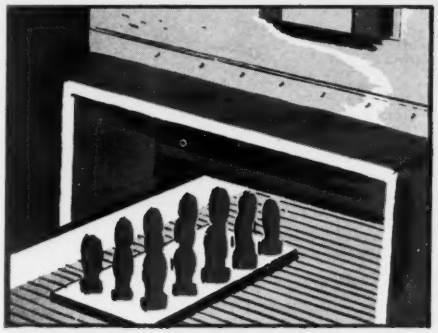
Look in the Yellow Pages under "Trucks, Industrial" for your nearest Clark-Ross Dealer.

CLARK® EQUIPMENT

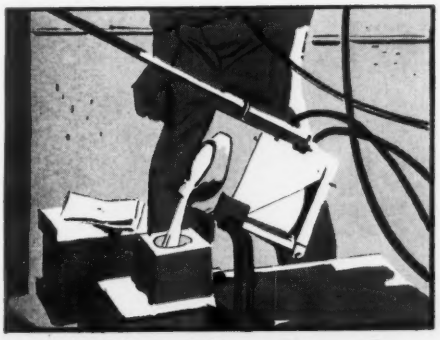
ROSS CARRIER LINE **CLARK EQUIPMENT COMPANY** Battle Creek 16, Mich.



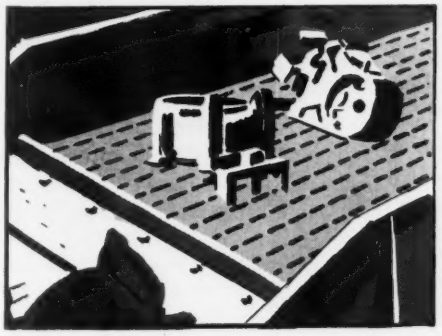
Superior Green Strength... Mogul-bonded cores maintain shape and dimension throughout handling and storage.



Quick Drying... This property cuts down oven time, thus increasing oven capacity.



Excellent Permeability... You reduce costly "blows" and casting loses due to inadequate venting.



Adequate Collapsibility... Mogul burns out at just the proper instant, eliminating strains and hot-tears.

Why MOGUL® is the preferred cereal binder

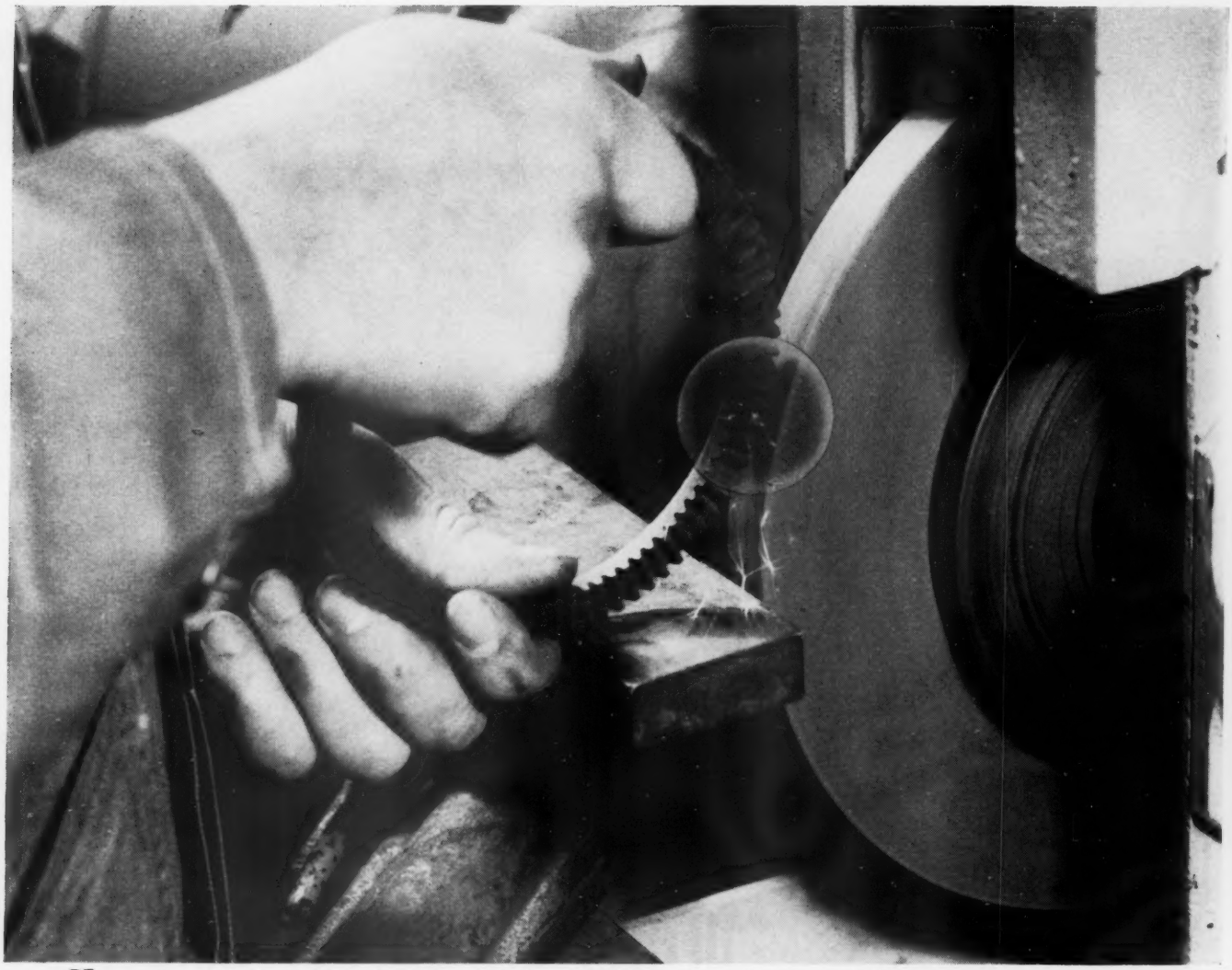
Performance-proved, Mogul Cereal Binder will save you money. Being a uniform product, Mogul Binder helps you standardize core mixtures. The short-baking time required by this binder gives you greater oven capacity. Mogul is available in bulk for use with automatic unloading and handling machinery.

Cores made with Mogul produce castings with a finer finish and exceedingly true pattern reproduction.

Our new research foundry laboratory assures product uniformity and performance. Our technical staff welcomes an opportunity to help you solve production problems. No cost or obligation.

CORN PRODUCTS REFINING COMPANY

17 Battery Place, New York 4, New York



BF—A universal favorite for deburring, lighter finishing, cleaning slots in castings, spot grinding cast surfaces for inspection, and many other light portable and bench grinding applications. For periphery grinding only.

The jobs they do!...The money they save!

Norton Reinforced Wheels add the "TOUCH of GOLD" that cuts time and costs on countless foundry grinding jobs

You get *more* than 100 cents' worth of usefulness for every dollar you spend on Norton Reinforced Wheels.

You get extra-long service life, exceptional strength and fast, cool, trouble-free grinding — the Norton-engineered "Touch of Gold" that saves you money in the widest range of cleaning room jobs, from light deburring to heavy cutting-off.

To this top grinding performance Norton Reinforced Wheels add a wide margin of safety. All four are resinoid bonded and reinforced by layers of tough fabric molded into them. As follows:

BF — *Semi-flexible straight wheel, cotton fabric reinforcement. Also available in mounted wheels and points and hand sticks.*

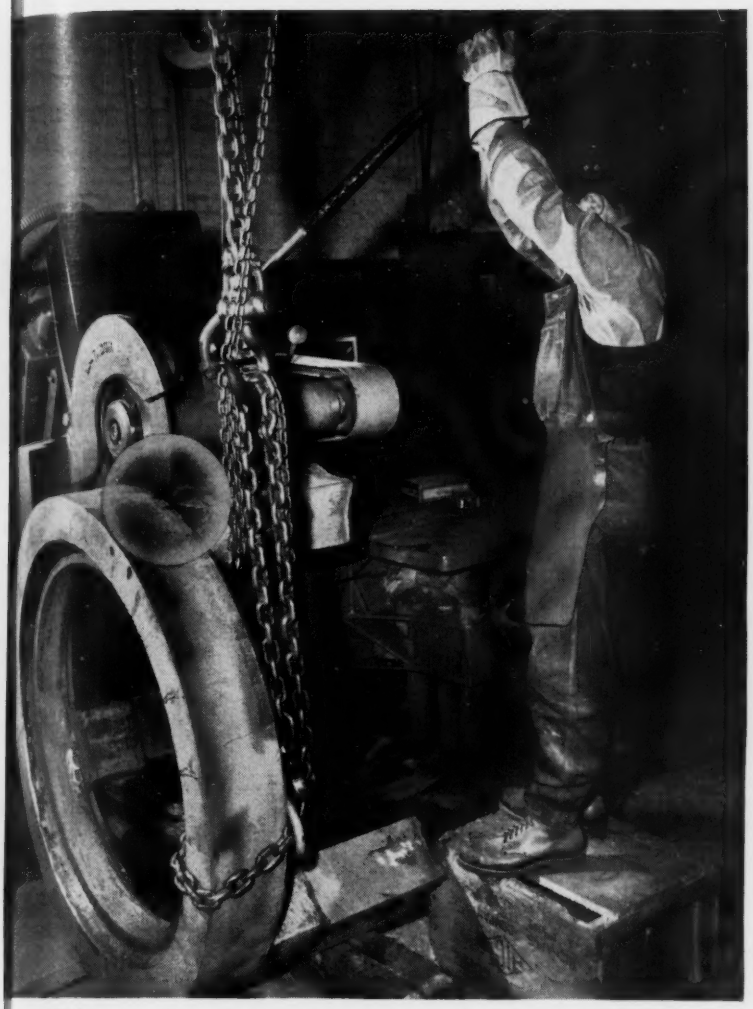
BN — *Straight wheel with glass cloth reinforcement. Primarily a cut-off wheel, its rough, knurled sides provide additional cutting action.*

BD—*Rigid hub-type. Glass cloth and Nylon reinforcement for extra hub-wheel safety. Designed especially for right angle portables and disc sanders.*

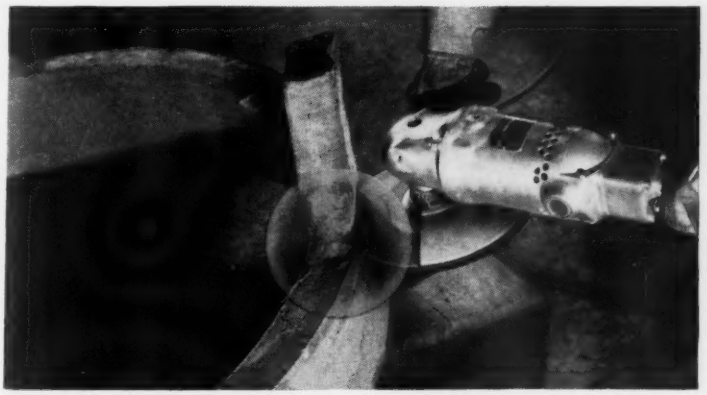
BFR—*Semi-flexible hub-type. Cotton fabric and Nylon reinforcement.*

See Your Norton Distributor

for a demonstration of Norton Reinforced Wheels in your foundry, on the jobs you're doing every day. Ask him for the new, 34-page illustrated catalog on reinforced wheels. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.



BN — The preferred cut-off wheel for non-ferrous jobs. Also excellent for deburring, slotting, cleaning and light snagging. Used on all types of heavy and light duty foundry cut-off machines.



BFR — Excels at the lighter portable jobs, such as removing rust and scale, light finishing, notching or cutting-off gates and risers. Reaches hard-to-get-at places.

BF — **Mounted Wheels and Points** have the same strong laminated construction as the larger BF wheels. For cleaning die cavities, chamfering, Brinell spotting, etc. For hand finishing, use BF sticks.

BD — A specialist in heavier stock removal jobs on all metals, such as cleaning between teeth of large gear castings, removing heavy scale, notching large gates and risers. Also for slotting and cutting-off.

W-1642

NORTON

Making better products... to make your products better

and its BEHR-MANNING division

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

Use REMA to add years of life to your Belts

REMA is the New and Amazing Self-Vulcanizing Rubber Repair Material

REMA REQUIRES
- NO HEAT
- NO HEAVY EQUIPMENT
- NO CURING TIME DELAY

• REMA is not just another cold patch. REMA is vulcanization by chemical process. The repaired area is sealed with an abrasive resistant cover stock patch. No heat or heavy vulcanizing equipment required. Here's the astonishing advantage—*when repair work is completed belts may be returned to service immediately.*

• REMA seals out moisture, reduces mildew, rot and deterioration — the great enemies of conveyor belts. Your own maintenance man can quickly repair your belt — it doesn't take a skilled belt mechanic to use REMA.

• Used for repair of all types of damaged spots, edge wear and for covering metallic joints. Available in introductory kits or parts separately.

Order from your Flexco-Alligator distributor

Write for Folder No. R4

FLEXIBLE STEEL LACING CO.
4667 Lexington St., Chicago 44, Ill.

REMA SELF-VULCANIZING
RUBBER REPAIR MATERIALS

Readers' Comment

Apprentice Article Useful

To The Editors:

At the request of this committee, I wish to ask you for copies of the article, "Related Information for Foundry Apprentices," published in your February issue of Foundry. We find it covers our program very nicely and we wish to distribute the information to the foundries surrounding our immediate vicinity and so arouse more interest in the program.

This is a labor-management apprenticeship committee which covers the Greater San Francisco Bay Area and over fifty foundries. As such, this committee wishes to express its appreciation to Foundry for recognizing the value of and publishing such an article as this.

Robert F. Girard
Molders and Coremakers Joint Secretary Apprenticeship Committee
California Metal Trades Association
1164 *Market Street*
San Francisco

* * *

How To Line a Furnace

To The Editors:

I was called upon recently to restore an old tilting furnace to be used in the melting of aluminum. That included the procurement of blowing and gas burning equipment. Not having an adequate background in nonferrous materials, I found Foundry an excellent reference in acquiring a working knowledge of the subject, but I could find little to aid me in lining the furnace proper. I finally found a salesman who was able to help me out. Perhaps an article on that subject might be of interest to your readers.

Robert B. Neumann
Box 126
Roscoe, O.

* * *

FEF Achieving Permanance

To The Editors:

Your editorial, "It Sells Castings" in the April issue of Foundry was certainly a welcome sight.

Many of us who have been close to the Foundry Educational Foundation since it first began can remember when this program was thought of as an experiment. Because of the personal devotion of many foundry industry leaders, we now find that this experiment has probably become a permanent part of the foundry scene.

Needless to say your remarks that the Foundation "deserves and should receive financial support" are most encouraging to us. As a matter of fact, many foundries might be interested in knowing that this program could be maintained on an even greater scale if more foundries were willing to share just a small part of the financial burden.

In view of your position in the industry, I know that your comments will be heeded by foundrymen throughout the country. The trustees appreciate very much your favorable comments.

Edward C. Hoenicke
President
Foundry Educational Foundation
c/o Eaton Mfg. Co., Detroit

* * *

Requests from Readers

To The Editors:

Please send me the following publications:

"Design and Dimensional Control for Investment Castings," by R. L. Wood, September, 1954

"Effect of Melting Frequency on Induction Melted Aluminum Alloys," by A. Saia, S. Lipson and H. Rosenthal, August 1954

"Inventory of Foundry Equipment," May 1954

"Equipment for the Small Foundry," May 1954

"Plastic Patterns Offer Advantages in Investment Casting," by R. S. Banister, September 1953

"New Precision Investment Foundry," by T. Operhall, January 1953

David Wood
Danville, Calif.

●

Please send me a reprint of the article, "A Practical Method for Vacuum Degassing of Nonferrous Metals," by H. F. Bishop, E. E. Layne and W. S. Pellini, which appeared in the December issue of Foundry.

F. A. Romano
Metallurgist
Monarch Aluminum Mfg. Co.
Cleveland 2

●

To The Editors:

I would like to comment on your Data Sheet and let you know what a great help it is to me in the problems I encounter during the course of my day as superintendent. If possible, I would appreciate having several extra copies of this data sheet in

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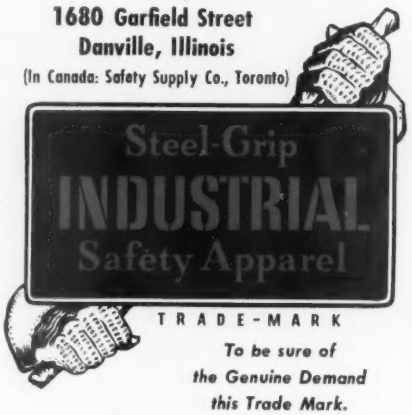

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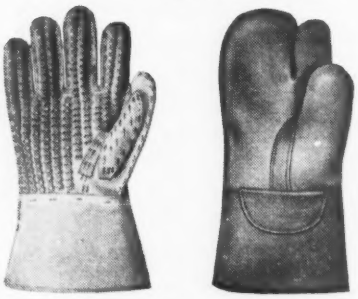

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the February issue. Also please forward a copy of the FOUNDRY index for 1954. Thank you for your attention to this matter.

N. V. DAVI
Superintendent
Pacific Steel Casting Co.
Berkeley 10, Calif.

●

TO THE EDITORS:

We would appreciate your sending us reprints of the following articles in the April issue of FOUNDRY.

"Steel Penetration," by R. C. Emmons and Jack Bach

"Fork Trucks and Foundry Handling Problems"

"Maintaining Casting Quality," by Byron E. Kennel

Thank you for this courtesy.

F. V. HERR
Manager
Industrial Engineering
Pratt & Letchworth Division
Buffalo 7, N. Y.

●

TO THE EDITORS:

Being an ardent reader of FOUNDRY and interested in the many articles printed therein, I would esteem it a favor if it would be at all possible to forward to me one copy of the reprint, "Coke Quality and Carbon Pickup" and one copy of "Principles of Risering" as noted in the March issue of FOUNDRY.

I fully realize you have to meet your home consumption of such reprints, but, I can assure you, that if it is at all possible to meet this request, it will be greatly appreciated.

JAS. V. G. HORSBURGH
3 *Halifax Ave.*
Benoni, Tvl.
South Africa

●

TO THE EDITORS:

We are interested in obtaining two sets of tearsheets of the article, "British Practice in Producing Aluminum Bronze Castings" published in the April FOUNDRY.

J. MARKOWICH
Superintendent
W. W. Alloys Inc.
Livonia, Mich.

●

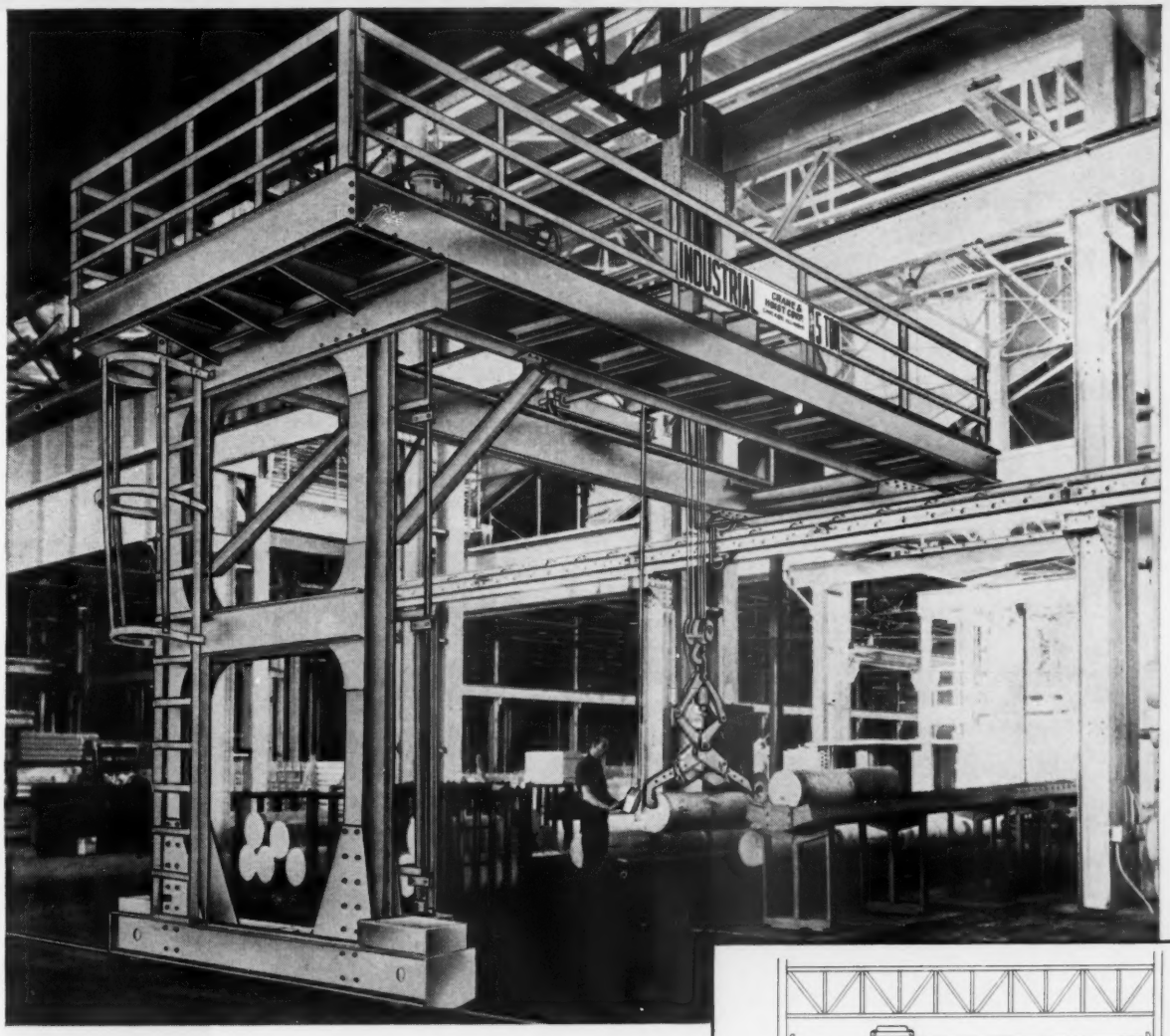
TO THE EDITORS:

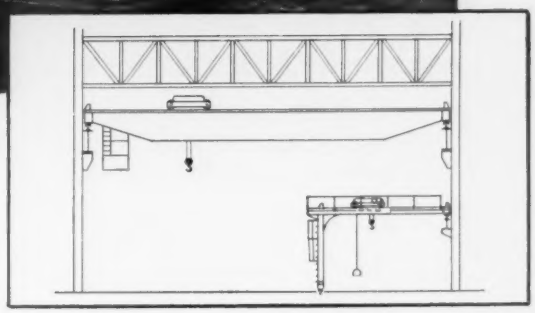
With reference to your March 1955 issue of FOUNDRY, is it possible for the writer to secure copies of "The Use and Care of Crucibles."

RALPH RATHYEN
Manager, Crucible & Refractories Division
Joseph Dixon Crucible Co.
Jersey City 3, N. J.

Editor's Note: While the supply lasts we are glad to send tearsheets of articles published in recent issues.

Industrial SEMI-GANTRYS SPEED BILLET HANDLING





The diagram illustrates the relative positions of the Industrial Semi-Gantry and the heavy capacity overhead crane, both of which operate without interfering with each other.

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- ☐ Bottom Boards
- ☐ Bands
- ☐ Upsets
- ☐ Slag Buggies
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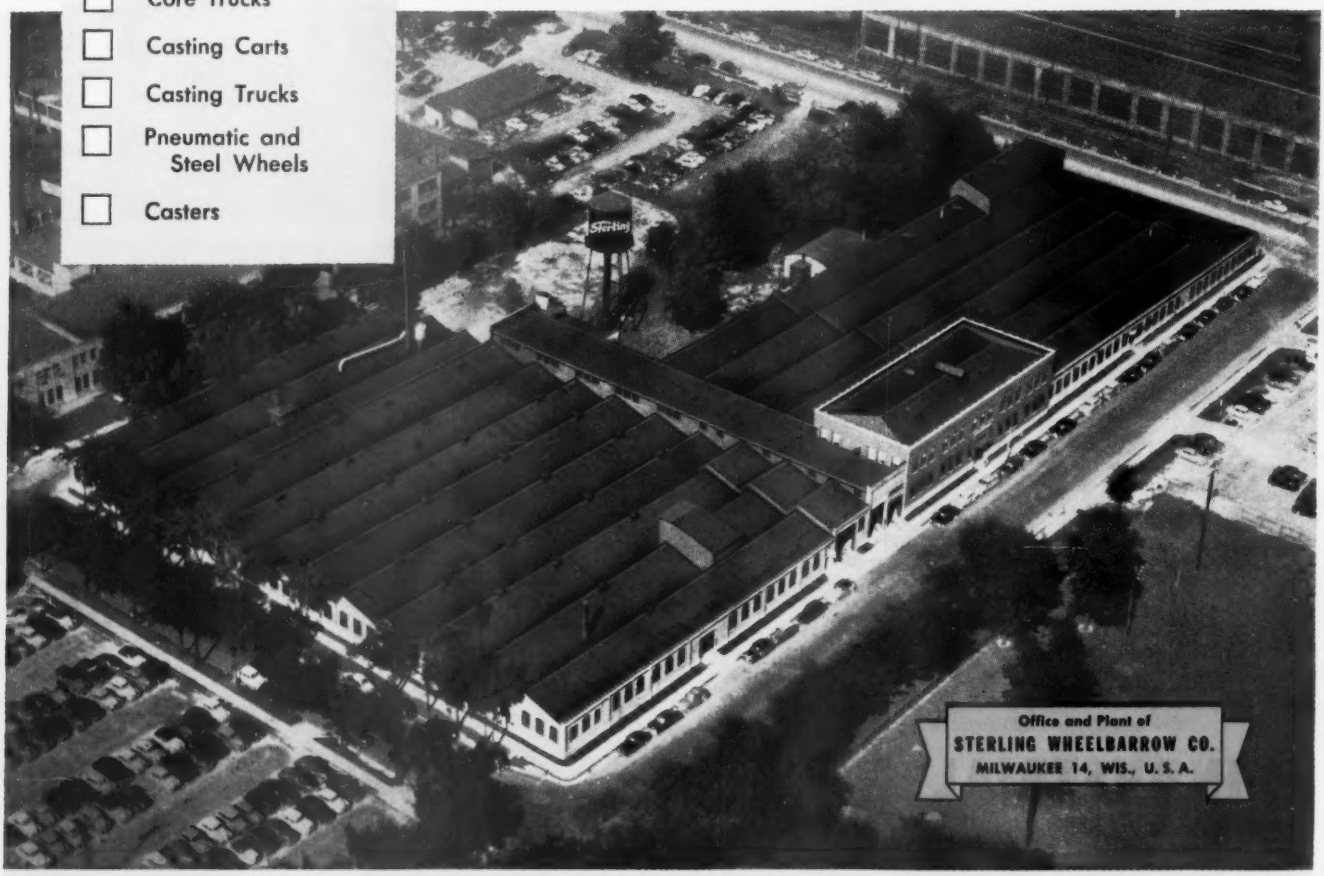

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Costs Can Be Cut

Foundry business is better. Operations have been stepped up, backlogs of castings orders are larger and the lead time on heavy castings is being lengthened. If present predictions covering general business conditions over the remainder of the year are accurate, requirements for castings should prove quite satisfactory in the months immediately ahead.

Will these welcomed improvements in demand for castings again cause some foundrymen to disregard numerous economies of foundry operation? Or will the recent trends toward cost savings and improvement in practices continue? Of course, the latter program of management will help build a bigger market for castings through a better product at a competitive price. All of this should lead to higher profits for foundries.

Savings in production costs can be directed along many avenues. An interesting example of what may be accomplished in a small segment of the operation was outlined by S. C. Massari, manager, Foundry Division, Hansell-Elcock Co., Chicago, in a paper "What Are Your Raw Material Costs?" presented at the AFS Houston convention. The author shows that because handling from receipt at the plant to point of use constitutes an important item in the cost of raw materials, a careful study of each operation and possible action in one of several directions can pay real dividends.

What are some of the author's suggestions? First of all, see if materials can be secured in forms or types better suited to present plant material handling methods. If not, study each operation to see if the rearrangement of methods or the purchase of new equipment will produce savings sufficient to cover the investment in a reasonable time. Examples of what was done are quite intriguing.

Skids for handling sand bonding materials from car to warehouse to mullers saved $3400 annually. An underground storage tank for core oil paid for itself in seven months, eliminates costly handling of drums and permits a lower price on oil through buying carload lots. Revamping the handling equipment for coke eliminated much breakage, provided equipment for handling sand, and resulted in a saving of $14,000 a year. Changing slightly the method of removing slag eliminated an accident hazard.

Undoubtedly, careful observation, a bit of ingenuity and the determination to save some money could do wonders in many foundries.

Frank G. Steinbach

Editor

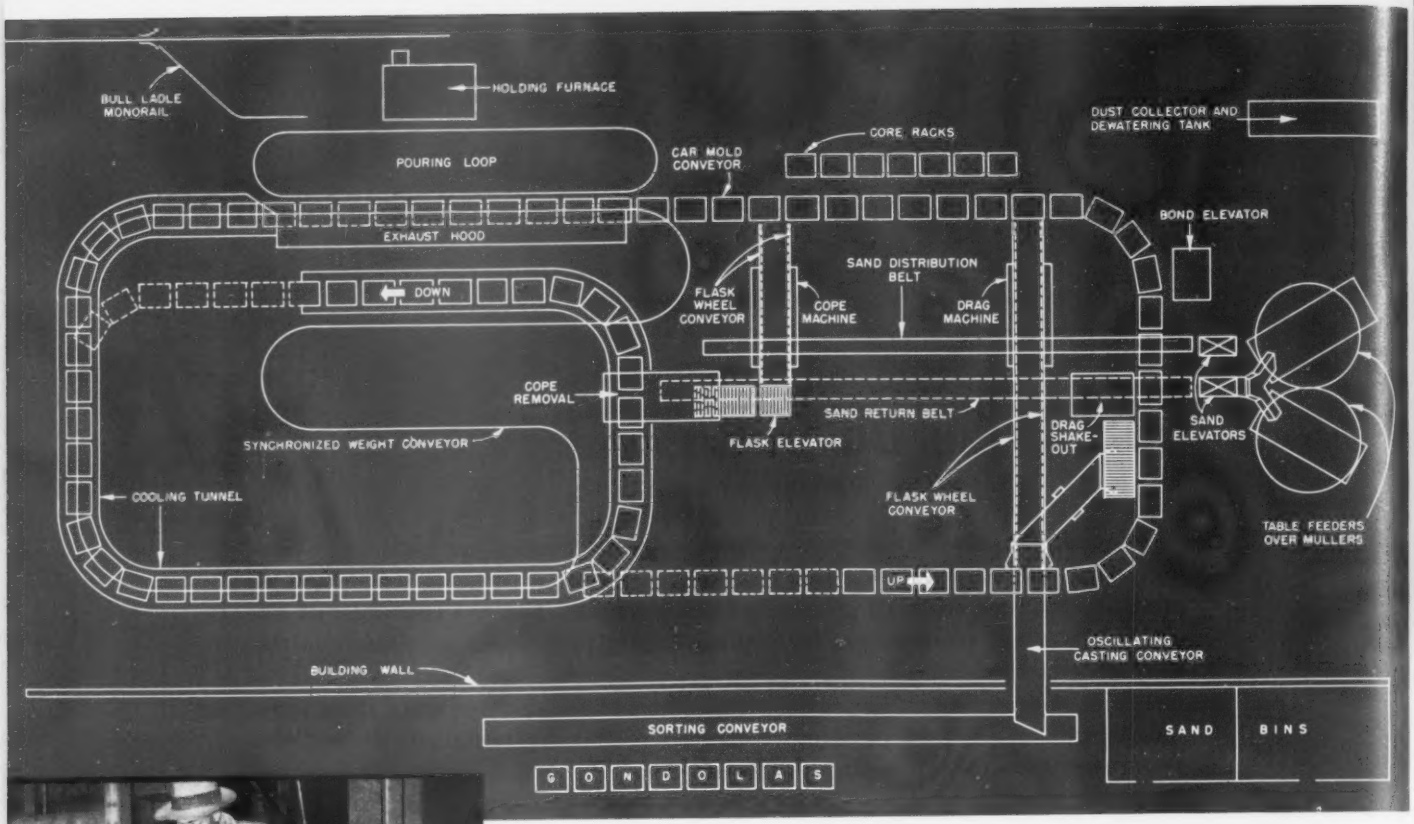


Fig. 1—Diagram of the automated molding line

Fig. 2—A core-setting operation on this line

AUTOMATED MOLDING LINE

Production methods for the automated and semiautomated molding lines, as well as related foundry sections of the gray iron foundry operated by Central Specialty Division, King-Seeley Corp., are described here

By ROBERT H. HERRMANN
Associate Editor

Fig. 3—Copes made on the automatic machines are lifted from the roll-out extension by air hoist

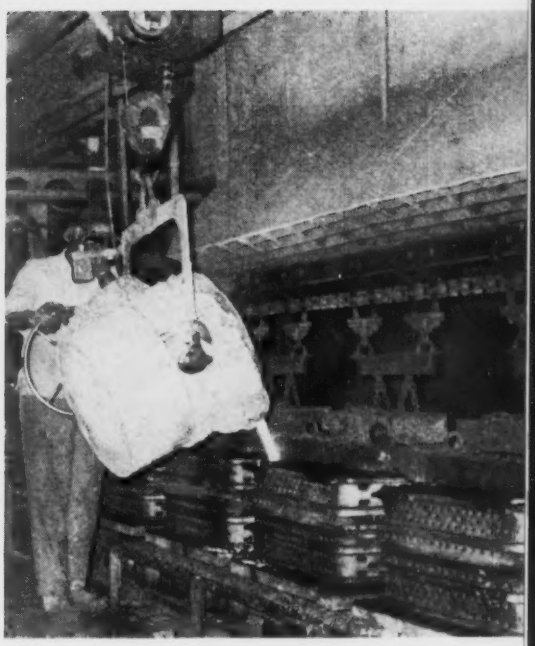


Fig. 4—Molds are poured on a car conveyor as it passes under a compensating air ventilating hood

SIXTEEN men operate the automated molding line at Central Specialty Division of King-Seeley Corp., Ypsilanti, Mich. Every hour they process 200 28 x 40-in. molds from molding machines to shakeout. Castings output from this line and from a semiautomated line and a floor-set-off section amounts to 130 to 150 tons per two-shift day. These are gray iron castings used principally in small power woodworking tools. Balance of the production is in automotive parts. Total foundry employment, production and office, is 250.

Newest molding line in the foundry is the automated unit. It was completed last summer and got into production early in the fall. Molding sand for this unit is prepared in two automatic, batch-type mullers of 1500 lb capacity. Synthetic sand is fed from a 100-ton storage hopper above each muller through a plate feeder to a stainless-steel-lined batch hopper. A micro switch in the batch hopper closes the plate feeder when a predetermined volume of sand has been reached. Also a probe in this hopper senses sand temperature. On the basis of this reading, water is metered automatically into the muller.

Western and southern bentonite, seacoal and wood flour are delivered to the foundry in bags. They are raised by elevator to second floor level where workers empty them into appropriate hoppers. The various bonds, depending upon molding sand characteristics desired for the work being done, are added automatically through volume-measuring devices.

The mullers are cycled at 75 seconds, and cooling air is blown through them during the mixing operation. Prepared sand is dropped to a belt conveyor which feeds a bucket elevator. At top of the elevator, sand is discharged into an aerator and then onto an overhead 24-in. belt for distribution to the two molding machine hoppers on the line. Limit switch sand level devices in these hoppers control plows which remove sand from the belt as needed. Sand flowing off the end of the distribution belt falls through a chute to a below-floor-level return belt.

Sand System Holds 200 Tons—Sand is prepared at the rate of 72 tons per hour for the automated molding line. The entire system carries 200 tons of sand. Samples are taken from molding machine hoppers every half hour for testing. Values are obtained on moisture, permeability, pH value and shear and compression strengths. Additional tests every 4 hr are made for dry strength and carbonaceous material content. Moisture is held at 3.5 per cent, carbonaceous material at 7½ to 8 per cent, pH value at 6½ to 7½, green compression strength at 10.5 to 11.5 psi and permeability at 100 to 110. Soda ash (sodium carbonate) is the additive used to bring the pH value to the desired level.

The two molding machines used on the line are completely automatic, straight-through type jolt-squeeze draw units. One makes copes and the other makes drags. Current production is 200 completed molds an hour, but plans are to boost it to 240. Flask size is 28 x 40 x 7-in. deep; cope and drag are barred identically. Empty flasks, parting side down, roll to each machine from shakeout on a gravity, wheel conveyor. Flask feed to the drag unit is straight in to the roll-in conveyor extension at the back of the machine. Empty flasks are held on the roll-in extension by a stop which is released when the machine is ready to take them. Flasks are moved into the jolt-squeeze station and out to the roll-off extension by a wheel-mounted shuttle

Fig. 5—Drags are removed from the car conveyor to shakeout by an automatic, hooked shuttle arm

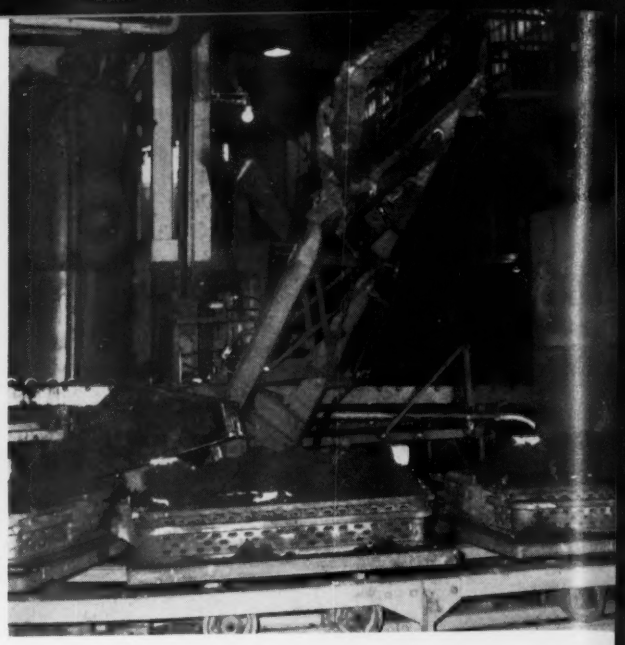


Fig. 6—Pivoted device swings empty drag flask from shakeout to conveyor feeding drag machine

Fig. 7—Diagram at top of opposite page shows layout of semiautomated molding line

propelled on an upper level track by a two-way air cylinder. Shuttle also has a vertically moving funnel-shaped sand guide which indexes below a gated, sand measuring hopper during flask fill. Other equipment on the shuttle from the sand guide forward are a strike-off arm, the squeezer head and mold push-off arms.

When the shuttle moves back over the empty flask on the roll-in extension, arms on each side engage the two flask trunnions. Sand falls from the storage hopper into the measuring hopper. As the shuttle moves forward, a cut-off plate closes off the sand storage hopper opening, the empty flask is carried to the joint-squeeze station, the pusher arms push a completed drag from the roll-off extension into the rollover and the strike-off bar supports push a completed mold from the jolt-squeeze station to the roll-off extension.

As soon as the drag flask is in position on the jolt-squeeze machine, it is lowered to the pattern. Guide pins and bushings assure proper alignment. Simultaneously the sand funnel is lowered and bottom gates on the measuring sand hopper open pneumatically. At completion of the jolt, the bottom gates on sand measuring hopper are closed, and the sand funnel is raised to its original position. At this point the flask-moving arms are disengaged from the flask trunnions and the shuttle moves back to engage the next empty flask. The strike-off bar strikes off surplus sand from the filled drag flask, and the sand cut-off plate slides away from the storage hopper opening to allow sand to fill the measuring hopper.

The squeezer head then is in position and the pattern plate with the filled flask is raised by air cylinder against the head for the squeeze. When the drag is lowered to original position the machine is ready to begin a new cycle.

The drag rollover previously mentioned is a U-shaped device which has flanged wheels on the inside of U-shaped bars at each end. Wheels on one leg of each U receive the completed drag. The unit rotates with the open end traversing the upper arc, the drag being held against the base of the U by gravity. When it has completed the 180-degree arc the drag is resting on rollers on the other legs of the U-bars. When the drag leaves the rollover, the latter revolves back to original position to receive the next completed drag.

Air clamps on a second air-operated shuttle lower, grab the completed drag and lift it off the wheeled conveyor. The shuttle moves over a mold car conveyor and lowers the drag. As it touches the car a limit switch is tripped and the clamps released. The transfer reverses its motion to pick up another drag. An electric eye scans the conveyor cars and permits the lowering device to lower a drag only when an empty car is available to receive it. Cores are set as the car conveyor moves to the closing station.

Molding the Cope—Copes are made on the same type of molding machine. Flasks, however, are fed from shakeout on a wheeled conveyor at 90 degrees to the roll-in extension. An elevator lifts them from the supply conveyor about a foot to the roll-in extension. The elevator makes contact with bottom edges of the flask ends by wheels mounted on two bars which, in the lowered position, are below the wheels which carry flasks onto the elevator. Wheels on the elevator bars are at a slight angle to the horizontal so that the flask will roll off the elevator when it is in the raised position to the roll-in extension. A guide bar holds the flask on the elevator until it is at the top of the lift.

Completed copes are lifted from the roll-out extension with an air hoist, and molds are closed by two men.

Weights carried by an overhead monorail con-

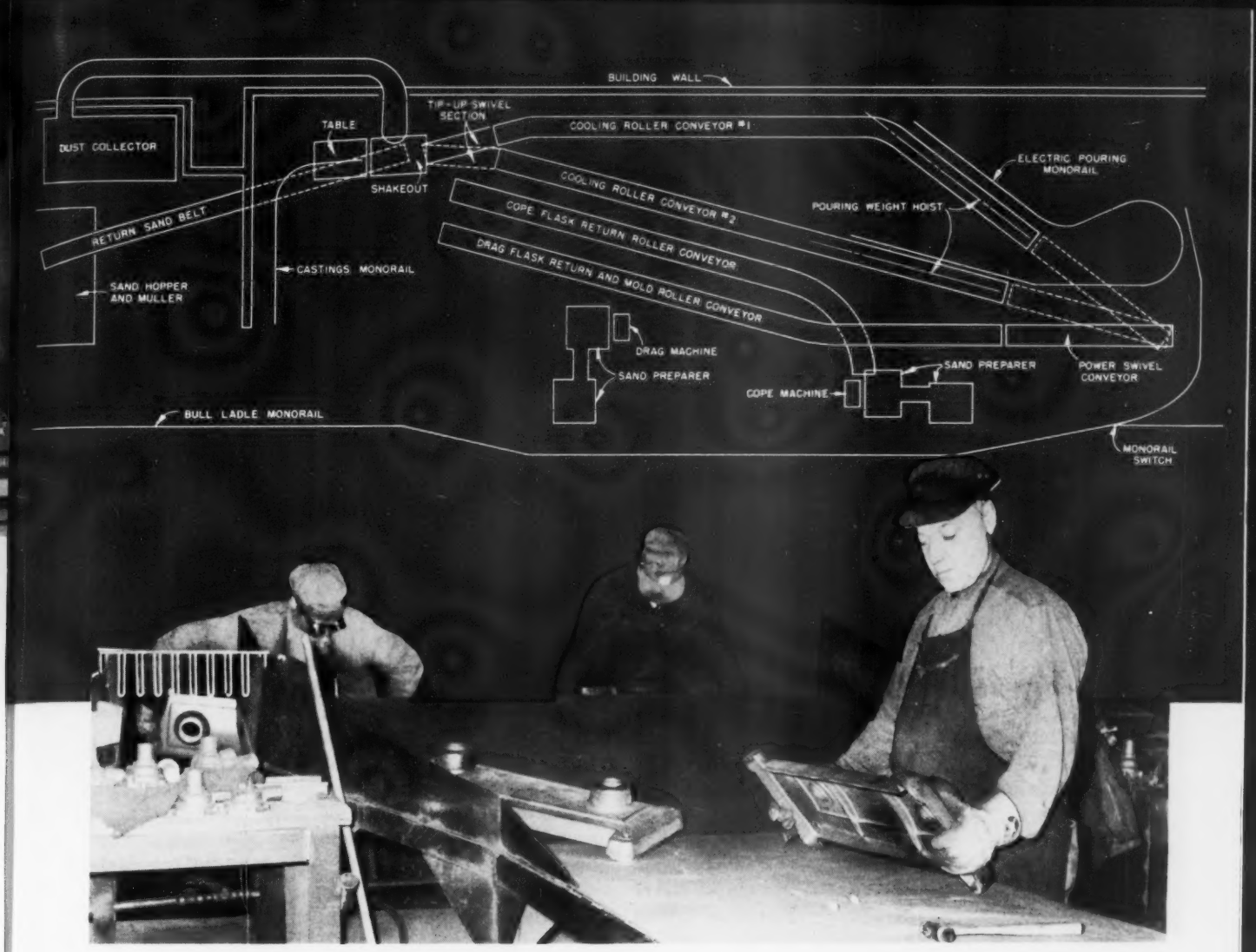


Fig. 8—Ground castings are picked from sloping metal tables, visually inspected and segregated

veyor, traveling at the same speed as the car conveyor, are lowered to the molds as they enter the pouring zone. Molds are poured from an 800-lb capacity ladle, hand pushed along an overhead monorail in front of a compensating air ventilation hood.

The mold-carrying car conveyor then enters a cooling tunnel and loops around 180 degrees. Then it makes a 90-degree turn in the direction of the pouring zone about midway along the back of the molding line oval (see Fig. 1). As molds leave the cooling tunnel the mold weight monorail curves upward to lift weights off the molds. The weight conveyor then curves around to the pouring zone. Copes are removed from the molds by a pushbutton-controlled device near the center of the molding line oval. Air-operated grab fingers mounted on a frame grasp the flask, which is lifted off the drag by a second air cylinder.

The lift-off device is swung through a 90-degree arc on a curved section of overhead monorail by a third air cylinder. As the lifter swings, it pushes a flask off the shakeout to a gravity wheel conveyor, leading to the elevator which feeds the cope machine roll-in extension. When the newly lifted flask is over the shakeout, it is lowered and the grab fingers released.

Shakeout sand falls to an underfloor, 24-in. return belt. Vibrating feeders under each molding

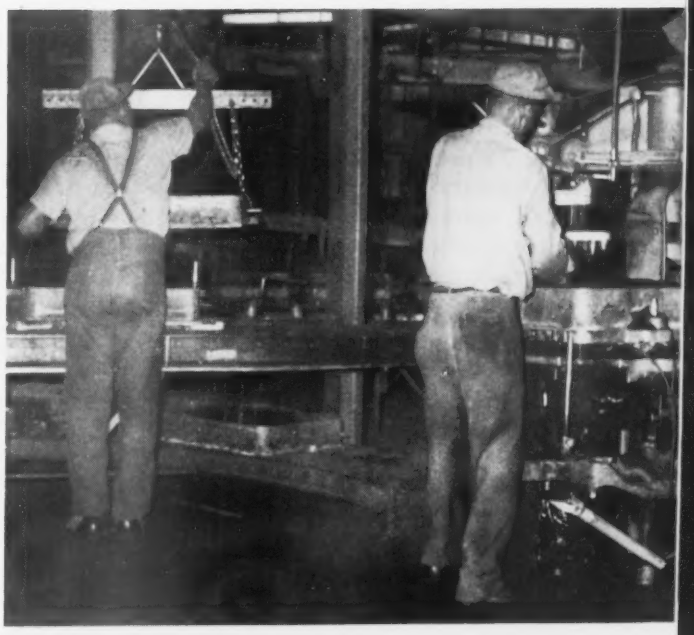


Fig. 9—On the semiautomated line, empty flasks are returned to cope machine on the lower conveyor. Molds are closed on the upper conveyor

Fig. 10—Poured molds are rolled to the shakeout by a tip-up, swiveling roller conveyor section

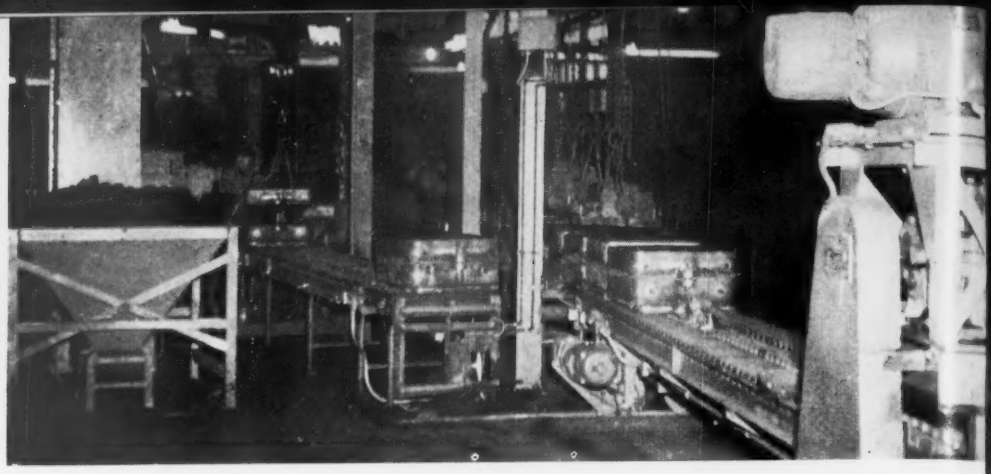


Fig. 11—Swiveling conveyor section moves molds from molding conveyor to the pouring conveyors

machine feed strike-off sand to the same belt. This return belt has 8-in. skirt boards along its entire 67-ft length. It travels over a magnetic pulley at the head end for tramp iron removal. Sand goes to a bucket elevator and is deposited on a vibrating screen. Screened sand falls into a divided chute for distribution to the 100-ton storage hoppers over each muller. Sand can be fed to either or both hoppers. Temperature of the sand at this point varies from 150 to 250° F.

After copes have been removed the mold car makes another 90-degree turn to run parallel with the pouring zone. It then descends below the floor and turns to follow the path of its upper level travel. Exhaust system in the cooling tunnel serves both conveyor levels.

The conveyor then ascends to floor level at a point just beyond where it first emerged from the tunnel for cope removal. It turns 90 degrees to enter the drag removal station. Drag removal device is an automatic shuttle operated by a combination of hydraulic and pneumatic cylinders. Consisting of a long arm with a hook on one end, it pulls a mold from the conveyor to one end of a vibrating shakeout and tilts the flask against stops to throw sand and castings to the shakeout deck. Flask is lowered to the shakeout for complete removal of sand. The shuttle arm then is raised pneumatically and moved back by hydraulic cylinder over the mold conveyor where it is lowered to engage the next flask.

A pushbutton-controlled hydraulic ram pushes the empty flask off the shakeout in position for a pivoted grab device to lift it, turn it upside down, rotate it 90 degrees and set it down on the gravity wheel conveyor feeding the drag molding machine. This flask handling device, shown in Fig. 6, has hydraulic-operated fingers which grab the flask, and is rotated in a vertical plane by hydraulic cylinders.

The car conveyor then makes another 90 degree turn to pass in front of the molding machines for reloading.

Sand from the drag shakeout falls through to the return belt previously described. Castings fall to an oscillating conveyor and are carried outside the building where they are deposited on an inclined apron conveyor which levels out about 3 ft above the ground and travels parallel with the side of the building. Men standing along the conveyor knock off gating metal and sort castings into tote boxes. Gates and sprues are dumped off the end of the conveyor into a sloping pit near the cupola charge make-up area. From there it is picked up by magnet on a bridge crane and put directly into the charging bucket or into storage bins.

Cupola Operation—Charges consist of 1600 lb of metal made up of 450 lb pig iron, 300 lb steel scrap and 850 lb home or purchased scrap; 210 lb coke; 65 lb limestone and 4 lb of a proprietary brand desulphurizer. Metal charges are dropped directly into the cone-bottom charging buckets by the magnet-equipped bridge crane. The two buckets used are carried on a transfer car operating on the floor of a pit. The car moves between two positions—one under a scale and the other under an overhead monorail crane used for cupola charging.

A clamshell bucket attached to the crawler crane unloads coke from cars or trucks to a storage bin. A vibrating feeder under an opening in the bin bottom feeds coke to the charging bucket. Limestone and the desulphurizing agent are shoveled into the bucket. Weights of all charge ingredients are recorded by a print-weigh scale.

Each of two 56-in. ID cupolas is used on alternate days. They are equipped with side tilting spouts for filling 800-lb capacity bull ladles carried by parallel overhead monorails. One monorail leads to the semiautomated molding line and the floor set-off department. The other services the automated line and a 5-ton capacity, oil-fired, tilting, holding furnace. Metal is tapped from the cupola at 2700-2750° F. Slag runs out the back into a large bucket which is carried away periodically by fork truck.

Metal is tested every half hour for silicon and carbon content. One test a day is made for graphitic carbon, sulphur and manganese.

Semiautomated Line—This is a gravity roller conveyerized system (see Fig. 7). Two jolt squeeze strip machines make molds for the line. Each machine is equipped with an overhead hopper filled with sand by independent elevating units which blend and aerate it in the process, then shut off

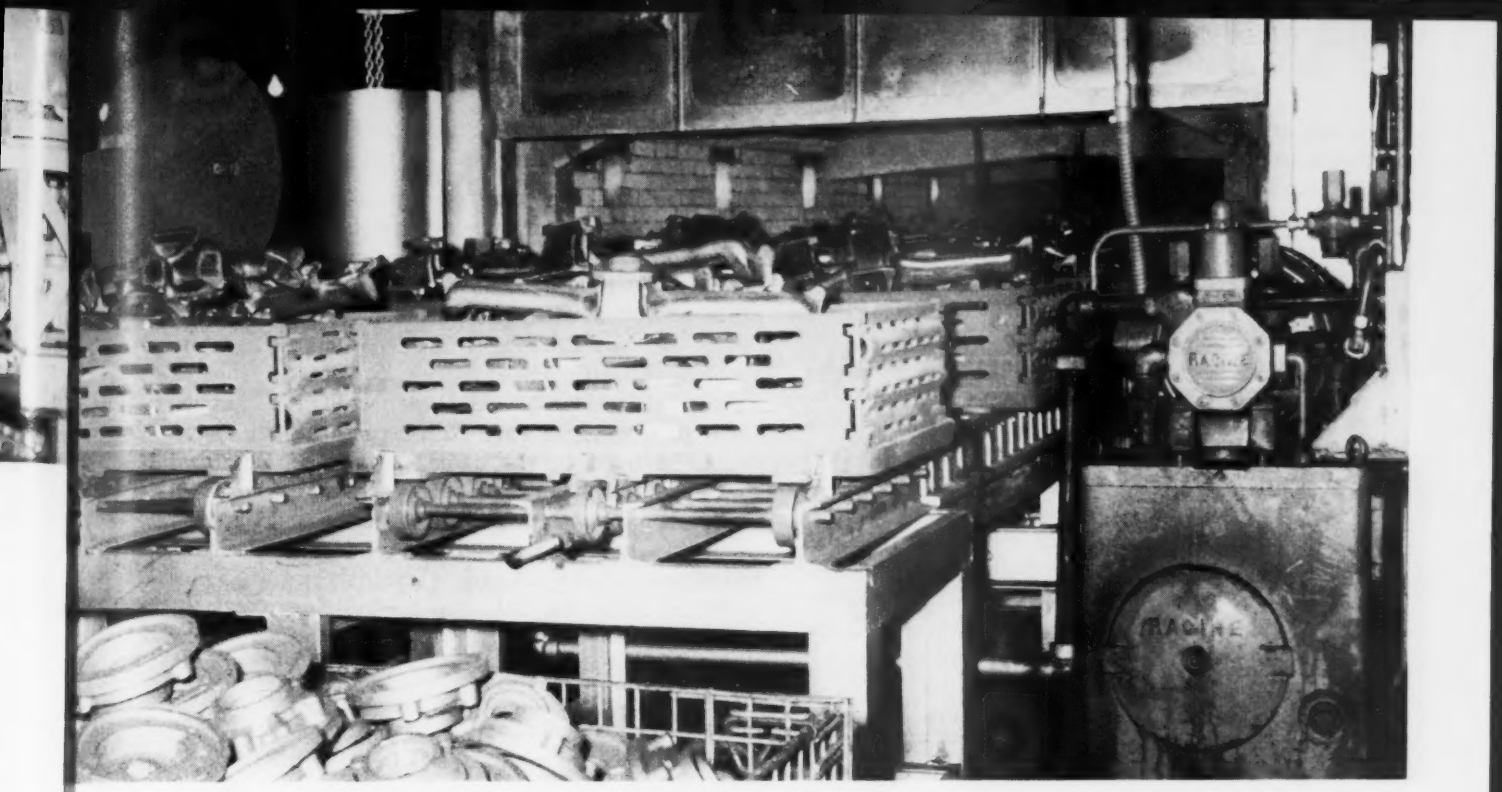


Fig. 12—Castings are loaded in perforated metal boxes for annealing in automatic, horizontal oven. Two boxes enter and leave the oven every 15 minutes

automatically when sand in the hoppers reaches a predetermined level. Sand is delivered to these units from the system's own sand muller in front-dumping buckets carried by fork trucks. These trucks also deliver sand to the eight molders operating squeezer machines in the set-off floor section.

Drags made on the semiautomated line are lifted from molding machine to roller conveyor by a jib hoist. They are pushed to the cope machine and closed. The cope also is moved by jib hoist. Just beyond the cope machine the roller conveyor slopes down; molds pushed to this point roll to the end where they are held by a foot-operated stop until a power-swiveled section of conveyor is ready to receive them. Power rollers on the swivel section receive the molds when the gravity conveyor stop is released. Swivel section will hold from three to five molds and can be rotated on a curved floor rail to line up with either of two roller conveyors. Powered rollers roll the molds to these conveyors for pouring.

Molds are weighted for pouring in an unusual manner. Weights are suspended by chains from an overhead bar hinged at one end to a support. The other end is raised or lowered by pneumatic cylinder. Pouring is done from a ladle electrically raised, lowered and propelled on an overhead monorail.

Just beyond the pouring zone the roller conveyors tilt down so that poured molds pushed to this point will roll to the shakeout area. A tip-up, swiveling section of roller conveyor aligns with either of the mold-carrying conveyors. A mold resting on this section is rolled onto the shakeout when the device is tipped. The shakeout is hooded and vented to a dust collector. Empty flasks are lifted from the shakeout by an air hoist on a bridge

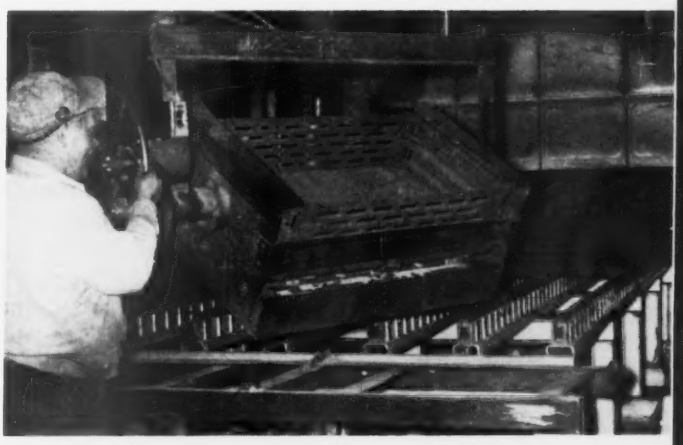


Fig. 13—Unique device, suspended from a hoist, is used to empty the boxes of annealed castings

crane and placed on roller conveyors for return to the cope and drag machines. Sand falls to a 24-in. belt for return to the muller supply hopper. Castings come off the shakeout to a low receiving table from which they are lifted by a hoist on an overhead monorail and loaded into buckets for fork truck movement to the cleaning room.

Cleaning and Heat Treating—Depending upon casting, some go first to the cleaning room, others are annealed first. Cleaning equipment includes two airless blast tumbling units loaded by skip hoist charger. An 8-ft-diam airless blast table is loaded by hoist. Eight tumbling barrels are loaded by hand or with a dump hopper carried by fork truck.

Grinding is done on five-double-end stand grinders located in front of sloped metal tables onto which

castings are tossed after grinding. At this point castings are inspected visually and segregated by types into hand-wheeled boxes or gondolas.

In addition, castings on which hardness is critical are 100 per cent brinelled. Those above a certain value are returned to the annealing department. Castings in the not-too-critical range are spot-checked on the brinell machine.

A gas-fired, horizontal annealing oven about 40 ft long is located at one side of the cleaning room. This is an automatic, continuous oven divided into three sections. The first heats castings to process temperature; the second soaks castings at temperature, and the third is a cooling area. Castings are carried through the oven in 22 x 36-in. perforated metal boxes. Capacity of the boxes is 650 lb, and loads are weighed on a print-weigh scale. Loading is done by hoist on the wheeled conveyor which returns empty boxes from unloading end to loading end of oven.

Loaded boxes are pushed from return conveyor to a transfer car which holds two boxes. The loaded car is pushed on floor rails to parallel sets of roller rails leading to the oven. Boxes are hand pushed from car to roller rails. A hydraulic cylinder opens the oven door every 15 minutes and two boxes are pushed into the oven by hydraulic rams equipped with pushing dogs. The dogs are so spaced that boxes are kept about 6 in. apart until they pass the oven door. This spacing permits the door to close. Inside the oven, boxes are moved forward by direct contact.

Exit door at the opposite end is opened simultaneously with the entry door, and, as two boxes enter, two boxes are pushed out. They roll away from the furnace on slightly inclined roller rails.

At the ends of the rails an operator hooks the boxes of castings into a three-sided box which has wheeled rail sections in the bottom, aligning with those on the roll-out extension. Trunnions at the ends of this box are mounted in a U-shaped frame attached to an electric hoist on a bridge crane. The box may be tilted through a gearing arrangement such as used on large pouring ladles. In this manner castings are dumped into tote boxes to be hauled away by fork trucks. The annealing oven box is held in the tilting box when in the inverted position by lips on the ends of the tilting box.

Coremaking—The coreroom, which supplies cores to all sections of the foundry, is equipped with nine stand blowers, two bench blowers and several benches. Three of the stand blowers are automatic units equipped with two coreboxes and a rollover device for withdrawing a core as the second one is being blown. Green cores are set on shelves suspended from an overhead monorail which carries them to a tower oven. Baked cores are unloaded from the oven to the same conveyor and moved to ceiling height. There they travel a short distance through an area which is exhausted by fan and into which cooling, outside air is vented. When the conveyor lowers to floor level it passes benches to which cores are unloaded for rubbing and loading into wooden boxes for transfer to the foundry by hand truck.

Additional coreroom equipment includes two batch ovens and a drawer oven for baking cores from the benches and one of the bench blowers.

Sand used in the coreroom is delivered in box cars and unloaded by front end loader to a floor chute covered by a grid. A bucket elevator carries sand to a 24-in. belt conveyor from which it is plowed, according to grade, into four 75-ton bins. One side of these bins forms a wall of the coreroom. Gated openings in these sides near the bottom supply sand to a weigh lorry hand pushed on a floor track in front of the bins.

Hopper of the weigh lorry also has a gated side opening through which sand is discharged to a skip hoist charger servicing the 400-lb capacity muller. Water and oil are metered, and dry binders are weighed on a table scale and dumped into the muller by hand. Mulled sand is discharged to a second skip hoist, which empties into a bottom-gated hopper on a mezzanine. Sand is distributed from this hopper to supply hoppers over the core blowing machines and benches by a hand lorry.

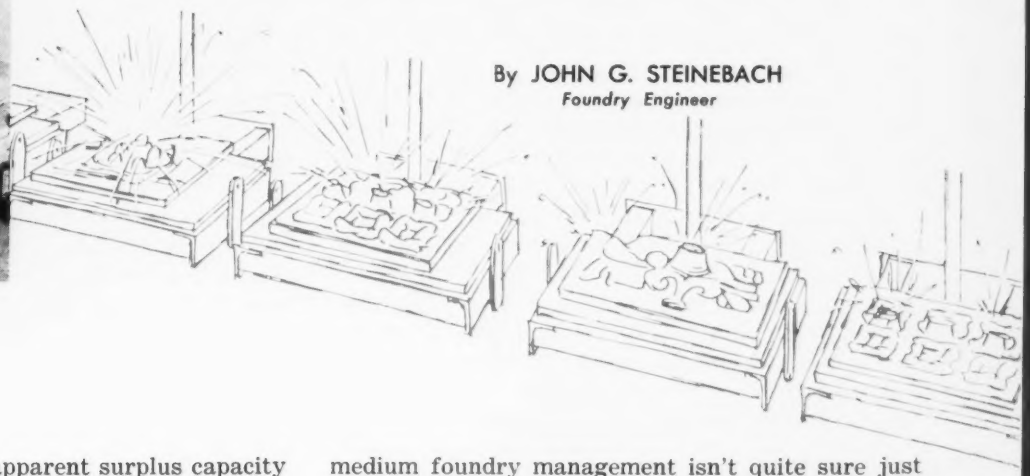
In addition to the sand and metallurgical laboratory, the company maintains a well-equipped pattern shop where wood patterns are made, gated and repaired.

Fig. 14—Cores are unloaded from tower oven to shelves of a carrier suspended from an overhead monorail conveyor. The same conveyor takes the green cores to the loading side of the tower oven

Does Shell Molding Belong in Your Foundry?

It's often difficult for a foundry to decide whether or not shell molding has a place in its operations. Here are some suggestions that may help in one's evaluation of the process

By JOHN G. STEINEBACH
Foundry Engineer



KEEN competition and apparent surplus capacity are prompting many operators of medium and small foundries to seek new ways to increase tonnage and profits. One such new tool is shell molding.

Rumor has it, paradoxically, that nobody is making a dime from shell molding, also that the process is going to replace green sand practice entirely. Obviously, there is no factual foundation for either of these stories. The truth lies somewhere between.

Actually, regarding shell molding, there are four classes of foundries. The first is producing quality castings by the shell process and making money selling them. The second is attempting to produce quality castings by the shell process but is plagued by all sorts of difficulties. They just don't seem to be able to get going. These are foundries who are in shell molding but probably shouldn't be.

The third class is "smart" enough to escape the "pitfalls" of shell molding. Its members ignore the process completely. Their philosophy is, "Let someone else be the guinea pig." These foundries may be losing out on a good bit of work, perhaps the difference between profit and loss, and they are not equipped to manufacture the type of product sought after by present and potential customers.

The fourth class is composed of foundries which have evaluated shell molding systematically and correctly concluded that shell molding would not help them move forward in today's market.

Where does your foundry fit into this table?

There's Often a Doubt—The average small and medium foundry management isn't quite sure just where shell molding does fit. It usually lacks the manpower, space or money necessary to install a shell molding department to determine the possibilities for profit and increased tonnage. Many shops have lost work or have been unable to bid on certain items because of a lack of shell mold experience. The operator of a small foundry finds that he can neither afford to practice shell molding nor afford not to.

It must be remembered that in the casting process, probably more than in any other, each job must stand on its own merits. Each foundry has problems, and the same solution will not necessarily work in different plants, or even on different jobs in the same plant. Any rule of thumb has many exceptions. Perhaps some general suggestions for evaluating the process and what to look for might help to clear the shmog (shell mold fog).

If you are considering pouring low-carbon steel into shell molds or shell cores you may have to do a bit of pioneering, although recent progress toward a successful process is reported. A surface dimpling usually appears to some degree on low-carbon steel castings cast in shells. It can be overcome partially through gross overfeeding. This practice, however, becomes a very uneconomical and usually unsatisfactory answer. Alloy steels react normally in shells.

The resin used in shell molding is a rather expensive item. Since it is used only once, the cost of a shell mold is considerably higher than that of a green sand mold made with the same degree of

mechanization. For this reason castings made by shell molding are to that extent somewhat more expensive than regular green sand castings. This fact, however, does not mean that shell molding is never more economical than other forms of molding.

Saving in Machining, a Factor—It sometimes is possible to cast a part accurately enough dimensionally and finishwise to eliminate a machine cut otherwise required. This aspect of the problem is best discussed with the shop doing the machining. If the piece is chucked and machined on several surfaces at once and the need to machine only one or two of these surfaces is eliminated, no cost reduction actually occurs. If you can eliminate a chucking operation on any type of machine or bypass the machining entirely, the customer should be willing to pay the additional cost involved in shell castings. The normal polishing sequence usually can be reduced greatly with a shell casting and requires fewer polishing belts.

Finish is determined primarily by the grain size of the sand used. The smaller the sand size, however, the more resin is required to coat or bond the sand. Hence mold cost increases. Good finish also requires good metallurgical control. No finish can be set up as an ultimate goal because many variables affect mold and casting smoothness. These variables include hydrostatic pressure on various parts of the mold cavity, type of metal poured, temperature of metal and shape and size of sand grains.

Surfaces obtained by shell molding enhance the beauty and saleability of a casting but, again, cost more. They should be attempted only if higher prices are attainable or if increased sales and production with a reduction in unit profit is desirable. If competition is consistently getting a better finish at a comparable cost, many other molding tools may serve better than shell molding. Better control of existing practices might solve your problem.

Don't Expect Too Much—Dimensional tolerances have long been argued by foundrymen experienced in shell molding. Do not plan on a casting of any magnitude to be accurate to 0.005-in. on all dimensions. Usually only one or two dimensions are critical on any given casting. With good equipment and proper procedures, any given dimension can be held to 0.004-in. per inch. Isolated cases turn up occasionally where better tolerances are held, but these are in plants with considerable experience in shell technique. Dimensions across the parting plane are much more difficult to hold than those completely within cope or drag cavities.

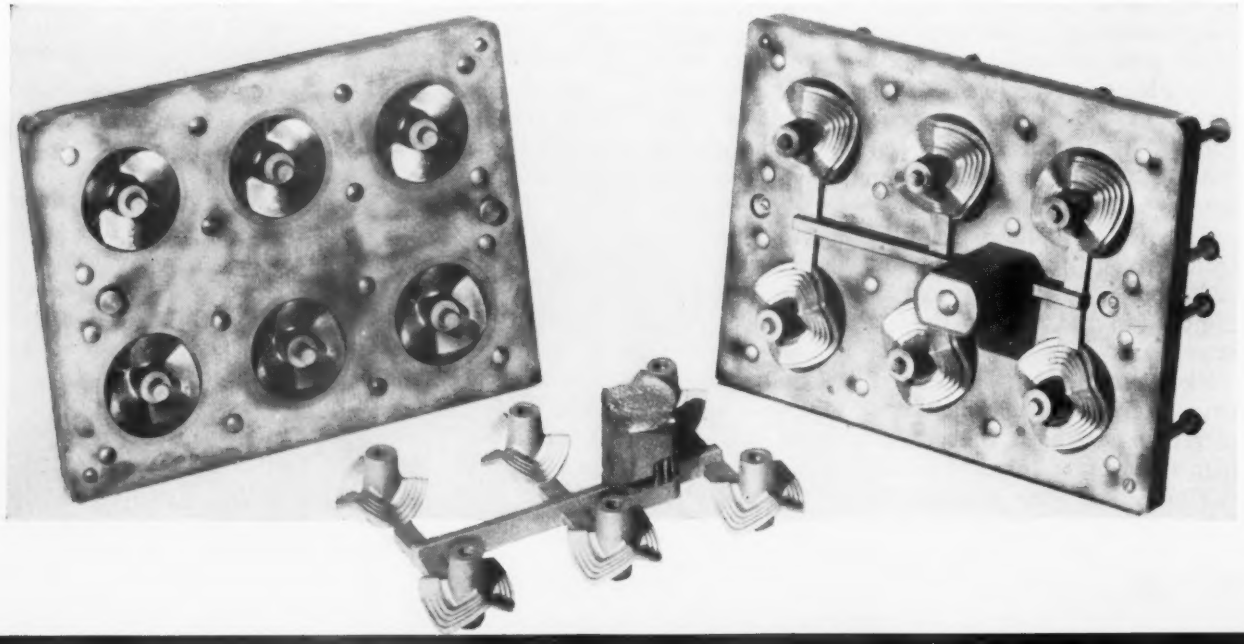
Shell pattern equipment is expensive. Cheap patterns will not yield the ultimate goals of shell molding. You will not get the accurate, flash-free, smooth castings you are seeking. With inaccurate patterns you will be using an expensive process to obtain true reproductions of the inaccuracies. Shell molding therefore must involve a large number of pieces in order to reduce the pattern cost per casting. Only high-production jobs and those in which other benefits overshadow the high pattern cost are economically feasible in shell.

It is entirely possible for a plant to use shell molding even if no existing work shows a need for it. Most plants are set up to produce one or two general types of castings. If this work is slack for a period, it might be wise to look into the various new molding techniques to find a new line of work to take up the slack in business. With a minimum amount of space and capital investment and a little research, you can discover lines of work which are not or cannot be made by green or dry sand molding. Such lines are available as camera and projector parts, furniture hardware and plaques (even foundry societies use plastic and paper!).

It has been claimed that in certain instances a stronger part is obtainable by casting in shell than by forging. This is the type of work most desirable for shell since it does not rob tonnage from another casting process. It offers one method of selling open capacity.

Weigh the Facts—All the above points should be weighed carefully against each job considered. Total costs for conventional practice and for shell

Accurate shell molding pattern equipment is expensive but necessary. A cheap pattern will not produce an accurate, flash-free, smooth casting

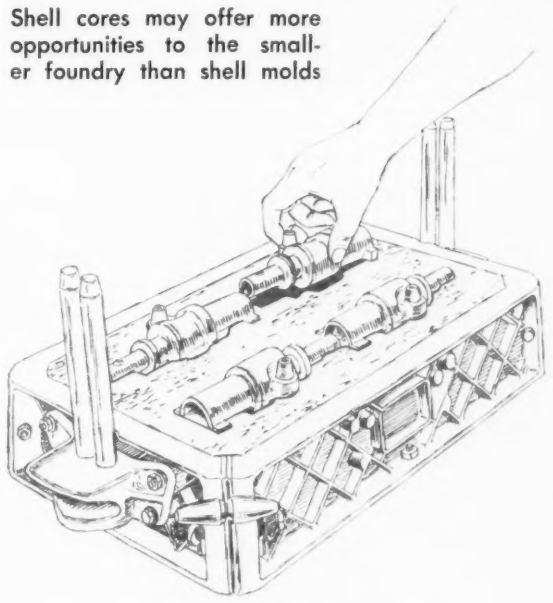


practice should be computed before any shell work is attempted. The approximate costs of shell materials can be obtained by contacting your sand representative. He undoubtedly has at least one customer using the shell process.

If you find after examining both the work in your shop and possible new work that shell molding does not lend itself to your operation, it might be well to look into shell cores. These perhaps offer more opportunities to the small and medium foundry than shell molds. The cores require no driers, plates, core racks, reinforcing rods or wires, wax vents, ovens, transportation to ovens or loading and unloading ovens. They require no cleaning or mudding. Cores may be pasted or otherwise assembled as ordinary cores, although intricate cores can be made in one piece with no flat surface or drier necessary. This process sounds like the answer to all coreroom problems, but is not quite perfect.

The shell core does not collapse easily in light metal castings, and practically all sections of each

Shell cores may offer more opportunities to the smaller foundry than shell molds



core must be hollow. A shell core requires from 2 to 4 per cent phenolic resin content compared with ½ to 1 per cent core oil or core resin content. This fact means that serious gas problems can develop rapidly unless extreme care is used to make sure all gas is vented off. This requirement means in essence that the core must be hollow in all parts except prints. Small cores or cores with extremely thin sections do not lend themselves to hollowing. It should be noted, however, that small pin cores with a vent hole through the center, or in some cases solid ones with a low resin content, are being used successfully.

The shell core normally is open on one print to allow the discharge of excess resin sand mix after the dwell period. Cores therefore must have large enough prints for this purpose. It is possible to produce such a core by introducing only enough resin sand mix into the heated box to coat the surface and then rolling or rocking it in all directions to get an even coating over the entire internal box surface. There is, however, no commercial machine on the market today to accomplish this job, and manhandling a heavy, hot box for extended periods is not feasible for production runs.

The shell core gives the same smooth surface as conventional shell molding. It sometimes is possible to use the same fineness of shell core sand to produce cores as is used for green sand molding. This practice gives a uniform casting surface throughout and avoids contamination of molding sand with coarse sand at shakeout.

Shell cores tend to be less expensive than conventional blown cores. The cycle is from 30 seconds to 1¼ minutes. Cost of materials is slightly in favor of the shell core because the shell core is hollow. The elimination of handling through ovens and the lack of driers, plates and reinforcement more than make up for the increased cycle per corebox.

Blow or Dump—Equipment is reasonably available today to blow shell cores or to dump them, as you prefer. Techniques are available to cold coat locally available sand with phenolic shell resins, using equipment common to the average foundry.

Employing commercially available or "do-it-yourself" engineered equipment, one operator should be able to produce 100 to 150 cores per hour. The complexity of the core has little or no bearing on the quantity produced.

The skill required of the machine operator is of a very low level since the core is baked before it is removed from the box. Ability to ram evenly, position reinforcement or draw without tearing is of no value. The method is a natural process for cores that insist on sagging prior to baking. Such cores are the same size as the corebox after baking. It is possible to make shell cores with iron chills imbedded in them, but not at the rate mentioned above. Experimentation with shell cores can be started with a minimum outlay of money. Sand and resin may be mixed in your present muller and poured into any properly prepared metal corebox.

Do not let your competition steal any of your tonnage because they are using tools that you are ignoring.

Shell Mold Foundries in U.S., Canada

Approximately 400 foundries in the United States and Canada are producing castings in shell molds.

This figure is based on preliminary data obtained from FOUNDRY'S biennial study of the two country's nearly 6000 foundries. Results of the study—covering other forms of casting operations as well—will be incorporated in the 1955-56 edition of *Penton's Foundry List*. The book will be published this summer.

The number of shell mold foundries has doubled since 1953. Two years ago 188 foundries in the United States and 9 in Canada reported they were making shell mold castings.

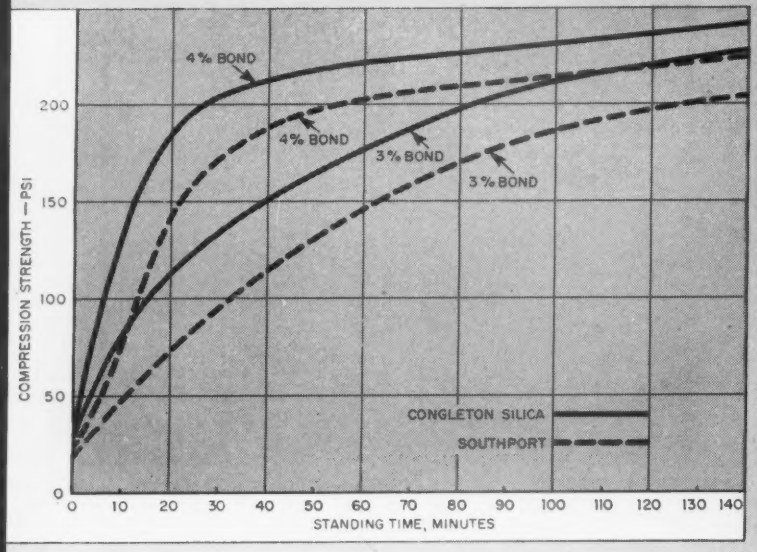


Fig. 1—Curves show rate of increase in the compression strength of standard pieces after they have been hardened by CO_2 and have stood in air

Fig. 2—View of part of the core shop at Perry Barr Metal Co. shows blowing and gas hardening of CO_2 process cores for die castings

THE CO_2 PROCESS

• • • *Its Use in British Foundries*

By ARNOLD TIPPER
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THE idea of using sodium silicate as a foundry sand binder goes back certainly more than 50 years. Yet it is only in the last two years that any significant advance in applying it on a production scale has occurred in British foundries through the medium of the CO_2 process.

Briefly, the process is a method of making molds and cores using a special sand mixture which is prepared from dry clay-free silica sand with the addition of a silicate base binder and, for some types of work, small percentages of powder pitch, coal dust, wood flour, etc.

Attention of the writer's company was drawn to the possibilities of this idea for the production of difficult shaped foundry cores by Messrs. A. & J. Augstein in 1947. Since that time we have been working on the development of a practical process and bonding agents which would meet the requirements of present-day foundry production. This means a binder which will 1) produce a readily workable sand with a reasonable degree of plasticity and flowability, 2) will give a firm hard core adequate for handling in the foundry and which can be used in green sand or dry sand molds, 3) will stand up to the wash of metal without scabbing, 4) will produce a good casting skin, and 5) will break down with reasonable ease after casting. Failure to meet some or all of these requirements is the reason why sodium silicate had not previously succeeded as a foundry sand binder.

Considerable success has been achieved in the past year in applying the CO_2 process using a specially developed range of silicate-base binders developed by the writer's company (sold under the trade name Gasbond). These have found application not only in light alloy practice, but also in gray iron, malleable, steel and nonferrous foundries. The process has now been demonstrated in over 400 British foundries, a considerable number of which have turned over part or all of their core

Fig. 3—A CO_2 process core is ready to go into the die as a casting is coming out, also at Perry Barr Metal Co.

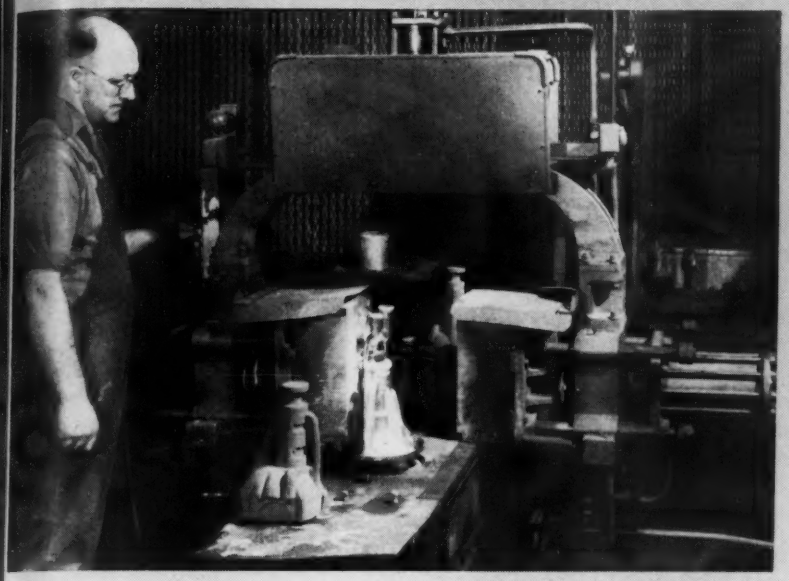


Fig. 4 (top right)—Rear axle housing die casting shows clean, bright cored surface finish obtained with a CO_2 process core. Fig. 5 (top left)—Showing how easily core is knocked out of casting shown in Fig. 4

production to the CO_2 process; in a number of cases they are also using the processed sand as a mold facing in place of oil sand or dry sand.

Simultaneously the CO_2 process has been developed independently in Germany by Schmidt and Philipp. The use of their Steinex process was described in an article by Schumacher in *Geisserei,* Dec. 24, 1953.

A Chemical Reaction—The CO_2 process is based on the chemical reaction between sodium silicate solution and carbonic oxide gas expressed by the equation—

$$Na_2SiO_3 + H_2O + CO_2 = Na_2CO_3 + SiO_2 + H_2O$$

Silica is precipitated from soluble silicate when the ratio Na_2O to SiO_2 has been decreased to a certain critical value, and this change is brought about by the action of CO_2 which converts Na_2O to Na_2CO_3.

The precipitation of silica in the form of a gel produces an immediate stiffening or setting of the adhesive. When this occurs in a rammed mass of sand grains coated with the silicate adhesive, the result is an immediate cementing together of the whole mass into a rigid structure. The conditions for successful hardening are somewhat critical, being dependent upon the type of silicate used and the moisture content.

Presumably the sodium carbonate produced by the reaction is absorbed by the porous gel together with the water present.

On standing in air at normal room temperatures the strength of the sand mass continues to increase slowly, accompanied by surface hardening. The rate of increase in strength for typical mixtures using a special proprietary silicate bond (Gasbond) is shown graphically in Fig. 1. On heating the mass of sand at 300-500° F for a few minutes, the strength of the film increases considerably as moisture is driven off; on cooling the strengths produced are at least equal to or better than those obtained with oil or resin bonds.

At high temperatures of the order of 1450 to 1800° F, e.g. red heat, the sand mass becomes plastic again due to partial fusion of the bond and the formation of a silicate glass. On cooling to room temperature, this appears as a fritted whitish mass which is very brittle and readily crushed to powder.

Sand Preparation—The special silicate base binders used are fairly viscous but readily pourable liquids with good storage life. They mix very easily with sand in any of the common types of core sand mixers or sand mills.

In preparing the sand care must be taken to avoid drying out the small amount of combined water in the bond; for this reason the sand used should always be cold and the milling time as short as possible. The order of additions recommended is: Sand and dry powders mixed together for about one-half minute, then add the measured quantity of liquid bond and mill for two to three more minutes.

If any sand becomes dry during milling, or when using a very fine sand as for shell molding, a little water should be added to keep the mix slightly moist. The amount required is a matter of experience, but usually from 0.25 to 0.5 per cent is adequate. The final mix should show a total moisture content of not more than 1.0 per cent.

The milled sand, which feels damp and slightly sticky but is very flowable, has a fairly low green bond, varying from about 0.75 to 1.25 psi compression strength, depending on the nature of the

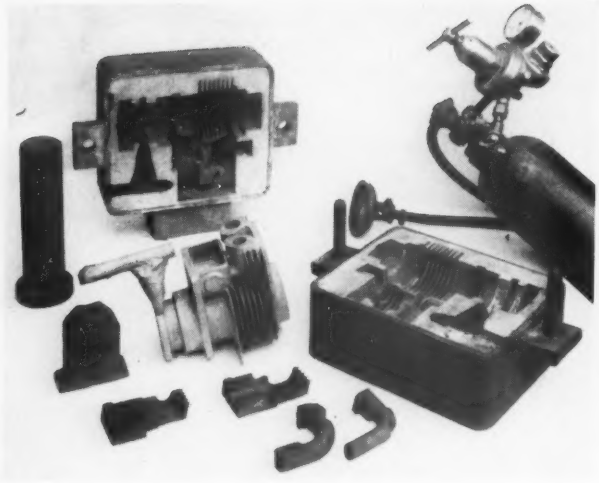


Fig. 6—Facing of half-molds for gray iron air-cooled cylinder was of a CO_2 hardened sand

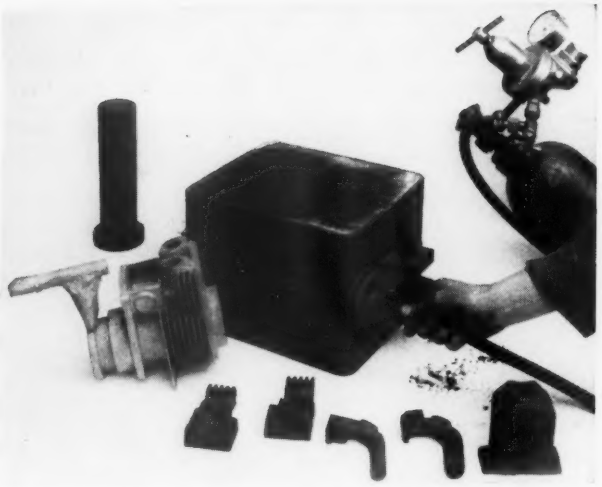


Fig. 7—Illustration shows method used to apply CO_2 to mold for the gray iron cylinder casting

sand used. It should be stored in bins or closed hoppers to protect it from air drying or accidental contact with the carbon dioxide gas being used.

For molding purposes requiring a sand of higher bond strength, special powdered bonding agents are available which increase the initial strength to between 1.5 and 2.5 psi. Special mixtures incorporating small proportions of clay-bonded sands are sometimes used for special applications where it is necessary to strip the pattern before gas hardening the mold.

Details of the mechanical analysis of some typical British silica sands proved suitable for the CO_2 process are given in Table I, together with details of the properties obtained in mixtures with a standard 4.0 per cent addition of bond.

Experience shows that best results in gas hardening are obtained from sands with rounded or subangular grains free from silt or appreciable clay. Inland sand deposits with coated grains showing a small clay content, such as Congleton, give appreciably higher initial bond than some washed sands, and produce an easily working mixture.

Generally speaking, the CO_2 process core shows

TABLE I—Analysis of Typical British Silica Sands Suitable for the CO_2 Process

	Congleton Silica	Southport Sea Sand	Redhill F Silica
SiO_2 content	96.4 (97)	91.8	99.1
Sieve test. Per cent remaining on B.S. Sieves No.:			
22	0.3	0.1	0.1
30	1.6	0.1	8.9
44	8.9	0.3	13.5
60	35.0	5.0	28.5
72	23.3	18.0	13.6
100	23.9	65.4	21.4
150	5.9	10.4	10.6
200	0.6	0.2	2.1
minus 200	0.5	0.5	1.3
Base permeability No.	200	150	190-220
AFS fineness No.	52	69	55
Character of sand	Subangular and rounded coated grains	Subangular worn smooth grains	Subangular clean silica grains
Compression Strength of Mixtures Containing 4% Binder, psi			
As milled	1.47	1.10	0.71
After gassing 10 sec., tested immediately	16+	15	16+
After standing 5 min.	80	75	40
After standing 30 min.	200	180	75

a higher permeability and lower residual gas content than a comparable oil sand core, so that blowing problems do not arise, and fine sands of relative low permeability can be used with safety for facings.

Coremaking and Molding—Coreboxes and patterns should be clean, dry and free from built-up sand. Although paraffin or liquid parting agents can be used to aid stripping, they are not recommended; best results are obtained using a dusting of fine waterproofed parting powder. Coreboxes which are vented for core blowing are preferred, as this enables the CO_2 gas to reach all parts of the core readily.

Having formed the mold or core by any of the normal methods of ramming, slinging or blowing, it is hardened or "set" by passing a stream of CO_2 gas at a pressure of 10 to 20 psi through the rammed sand.

Before applying the gas, the box, if necessary, is rapped lightly or vibrated to assist stripping; however, with all-metal core box equipment having good surface finish this should not be necessary if the core surface has been hardened properly.

In the case of small to medium size cores hardening is accomplished in 10 to 30 seconds. For large molds or cores weighing several hundred pounds where gas has to be applied at numerous positions, the operation may take as much as 10 minutes.

After gassing the mass of sand is sufficiently strong to be handled without fear of distortion on removal from the corebox or pattern. It is immediately ready for assembly, coring up and casting.

For heavy iron and nonferrous castings it is usual to spray or paint mold faces and cores either with the normal water-base blacking or plumbago wash, which must subsequently be dried.

Production—A few examples from foundries now using the CO_2 process in production will serve to illustrate the possibilities of the process.

At the foundry of the Perry Barr Metal Co. Ltd. (a member of the Birmid Group) sand cores are used for many aluminum die castings. Fig. 2 shows

a section of the coreroom which has recently been changed over to use the CO_2 process. Cores are blown of the following sand mixture: Dry Congleton silica sand 200 lb, Gasbond GB/9 binder 8 lb, fine plumbago 2 lb, moisture 0.8 to 1.0 per cent. Sand properties: Green bond 1.25 psi, green permeability 150 AFS, strength after 10 seconds gassing and 5 minutes standing 50 psi.

The filled corebox is transferred after blowing to a separate fixture where CO_2 is applied through a special gassing device for a period of 10 seconds at a pressure of 15 to 20 psi. The core is then stripped and stacked on a core rack ready for transporting to the die casting machine, Fig. 3. (Note. Cores if not required immediately may be stored safely for several days and are still usable.)

The die is fed with cores which are positioned on the die base by the operator. This is moved into the casting position and the die closed by a power operated mechanism working to a fixed time cycle. The casting produced, a rear axle housing, is illustrated in Fig. 4, showing the clean bright cored surface.

After removal from the die, castings are allowed to cool before knocking out the core on a pneumatic vibrator. Fig. 5 illustrates the ease with which the core sand falls out of the casting when hit with a light hammer. This is a surprising feature of the process, and particularly so with aluminum castings.

One of the reasons why the CO_2 process core has proved so successful for the aluminum die foundry is that the cores produced in this way remain accurate in dimensions. They are really true to the corebox in which they are made; consequently if the die location is also correct, the core is a dead fit in the die, and metal sections can be held to closer tolerances than with the general run of oil sand cores.

Another typical example is the gray iron air-cooled cylinder casting shown in Fig. 6 together with two half molds and a set of cores. These are made by the Central Foundry, Oldbury, near Birmingham, for the Villiers Engineering Co. These molds are normally made with a facing of oil sand, the half mold being blacked and then baked in a continuous core oven for two hours.

The CO_2 sand mixture used for facing these

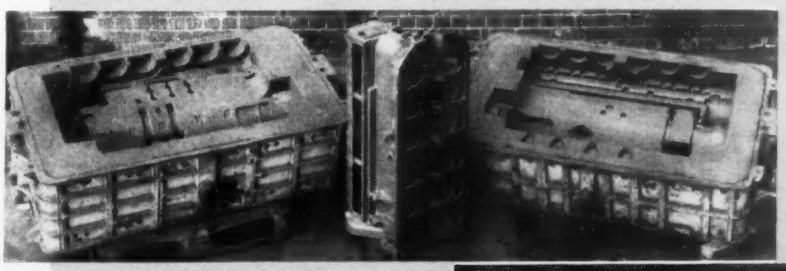


Fig. 8 (left) — Half-molds for 500-lb gray iron cylinder block casting were faced with the CO_2 process sand. Casting also is shown

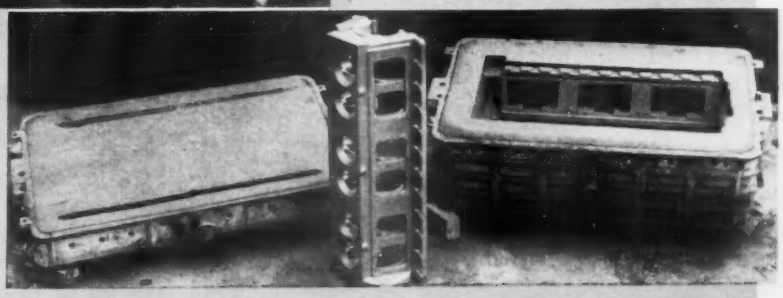
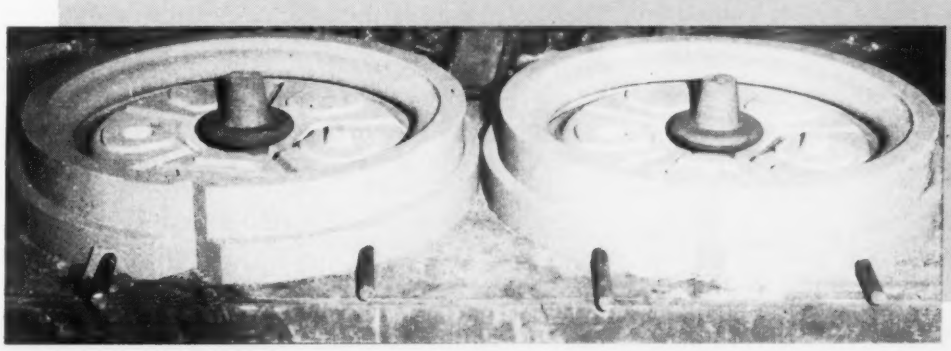


Fig. 9 (right) — Half-molds for a gray-iron six-cylinder crankcase casting were faced with the CO_2 process sand. Casting also is shown

Fig. 10 (below)—Pair of molds for cast steel sheaves 30 in. in diam. The whole mold is made as a core assembly, without flasks or core rods. Fig. 10A (below, at right)—View of the cast steel sheaves produced in CO_2 mold



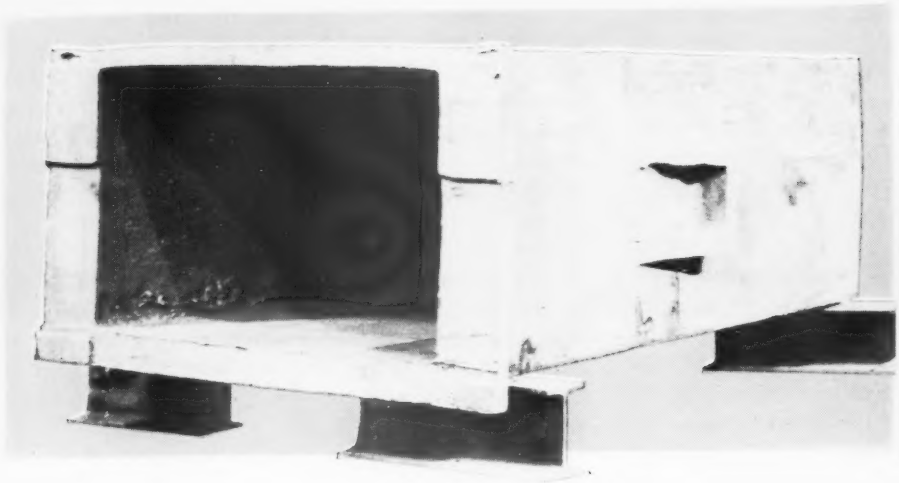


Fig. 11—Steel slag chute casting made with the CO_2 process. The main core alone weighs 5 tons

Fig. 12—View shows small portion of a CO_2 process mold stripped from face of a steel casting

molds consists of Southport sea sand with 4 per cent Gasbond GB/10, 0.5 per cent pelleted pitch and 0.25 per cent paraffin.

The half pattern is rapped and stripped before gas hardening, then the two halves of the mold are assembled and the gas hood placed over the downgate opening (see Fig. 7). CO_2 is applied for one minute at a pressure of about 15 to 20 psi. The mold is then opened, cores placed, reclosed and clamped after blowing out any loose sand. It is then ready for pouring. Besides stepping up production the clean outline and good surface finish obtained on deep-finned casting is a characteristic of the process.

In a number of foundries producing engineering and heavy automobile gray iron castings in dry sand molds, the CO_2 process has cut in half the time cycle for molding and finishing ready for pouring. Not only is drying time saved but much less nailing and sprigging is necessary when using a facing of CO_2 process sand.

Considerable use of the process is now being made in the Coventry foundry of Sterling Metals Ltd.—one of the largest independent foundries producing cylinder and cylinder head castings for the British motor industry, particularly for the larger dry sand work.

Fig. 8 shows two half molds for a large cylinder block casting for a Dennis engine, together with the casting so produced which weighs approximately 500 lb. Each half mold takes about 225 lb of special facing sand, the batch for a complete mold consisting of 360 lb dry sea sand, 20 lb Bromsgrove Red, 16 lb Gasbond GB/9, 4 lb Green Bond A1 and 1.2 per cent moisture. Green strength is approximately 3 psi.

This special sand facing is hand rammed to a depth of 2 to 2½ in. around the pattern. Then the flask is placed in position and filled with backing sand by a sandslinger. After strickling off and turning over, the pattern is rapped and lifted. Any defects in the mold face can now be repaired by hand before gas hardening by means of a single hood covering the whole half mold. After gassing, which takes 1½ minutes at a pressure of 15 psi, the mold is sprayed with a plumbago-base water blacking and surface dried with a gas torch. Fig. 9 shows another pair of molds for a six-cylinder crankcase casting weighing about 400 lb.

Apart from the saving in drying time, these castings produced by the CO_2 process have shown consistent improvement in dimensional accuracy over those produced by normal dry sand molding methods. No blowing or scabbing troubles have been experienced so far and the castings also are cleaner and better looking.

The CO_2 process also has its application in the steel foundry for both large and small castings. Most intricate heat-resistant alloy steel castings for aircraft, formerly made by an investment process using ethyl silicate bond, are now being made equally successfully from cores and molds made with a mixture of fine zircon (zirconium silicate) sand and CO_2 process binder. The dimensional accuracy and surface finish on these castings are said to be equally as good as from the investment mold, while the cost per mold is much reduced.

At the other end of the scale, steel castings up to 10 tons in weight are regularly produced at Glanmor Foundry Co. Ltd., South Wales, using CO_2 process molds and cores. Fig. 10 shows a pair of molds for 30-in.-diam cast steel sheaves. The whole mold is made as a core assembly without flasks or core irons. Rods 4 x ¾ in. are welded to form a square, two of the rods being long enough to protrude through recesses in the corebox itself, and these are used for lifting and cramping the cores together for casting. Molding is by hand, and one molder completes the molding, gassing and closing in less than one hour per casting. The casting itself is shown in Fig. 10A.

Fig. 11 shows a 4½-ton cast steel slag chute made by the CO_2 process. The casting measures 9 ft x 4 ft 6 in. x 2 ft deep, and the main core alone weighs 5 tons.

By normal dry sand methods this same casting was produced in five days, including two days and nights for drying the mold and cores. Using the CO_2 process the same casting was made in 32 hours from the time of starting. An excellent strip

Fig. 13—CO_2 process also is used for cores in nonferrous production like bronze valve castings

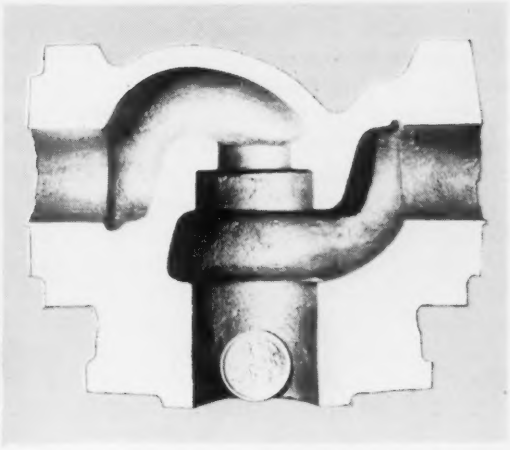


Fig. 14—Cleaned cored surface of a sectioned bronze valve casting made with the CO_2 process

is obtained from the mold, and no trouble has been experienced with hot tearing.

The sand used is a local sea dune sand with 4 per cent silicate base binder. No dressing is applied. On these heavy-section steel castings the face of the mold is fritted to a whitish gray mass for some depth, but when cold this strips away cleanly from the casting. As an illustration of this, Fig. 12 shows a small section of the mold surface stripped from a steel casting at Glanmor Foundry, showing a portion of the cast-in trademark. This fused sand is not reclaimed, 100 per cent new sand always being used in the facing mixture. Pneumatic chisels are employed in cleaning these castings, which readily break away the fritted sand.

It is estimated that apart from saving several hundred crane lifts per week by the use of the CO_2 process, the cost of carbon dioxide used is only half the cost of the coke previously used in the drying ovens, thus showing a saving of 50 per cent of the fuel bill.

As mentioned previously, refractory materials other than silica sand can be used successfully with this process. Sillimanite and zircon sands make excellent facings for castings of high-melting-point alloys, and the superfine grades reproduce the fine detail required in producing castings for die molds in heat-resistant alloys. In many special applications of this nature the CO_2 process can be applied with advantage both in time and cost.

CO_2 process cores are being used also in a number of nonferrous foundries producing gunmetal and bronze valve and steam fitting castings. The examples of cores shown in Fig. 13 are from the foundry of Sydney Smith & Sons (Nottingham) Ltd. The core mixture consists of 3½ per cent GB/10 binder in Kingscliffe silica sand with 0.5 per cent pelleted pitch. Cores are hand rammed or blown on bench (cartridge type) core blowers and gas hardened in 10 to 15 seconds per core. The core knockout is very easy and the excellent internal finish obtained is seen in Fig. 14 showing a sectioned valve casting in 85-5-5-5 alloy. Occasional trouble with internal finning has been eliminated since adopting the CO_2 process in this foundry, as well as a marked speeding up of production.

Methods of Applying CO_2—For the small user the most convenient available form of carbon dioxide is the high-pressure cylinder containing 28 lb liquid CO_2, fitted with a suitable form of pressure reducing valve such as the BOR13/CO_2 valve produced by the British Oxygen Co. Ltd. A typical arrangement for a single cylinder is shown in Fig. 15. This makes use of a Scott high and low pressure reducing valve with a copper heating coil between.

For the foundry requiring a continuous supply of gas a number of cylinders can be arranged to feed simultaneously through a manifold to an intermediate pressure chamber from which a number of connections are led to the individual coremakers benches or gassing points at low pressure (Fig. 16).

Alternatively, solid CO_2 may be used with a suitable gasifier such as that supplied by the I.C.I for use with Drikold, supplied in 25-lb blocks, illustrated in Fig. 17. A number of larger users of the

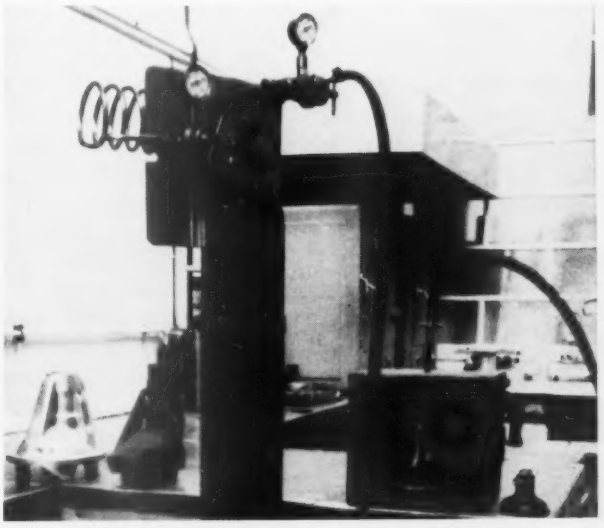


Fig. 15—This single cylinder of CO_2 with reduction valves is suitable for small-scale work

CO_2 process are now equipped with these gasifiers (each holding 100 lb solid CO_2) which are jacketed high-pressure vessels. The jacket may be heated with water, low-pressure steam or electrical heating elements and fitted with a safety device which cuts off heat input when the gas pressure rises above a set value.

Some difficulties have arisen with interruption of CO_2 supply due to freezing up at the cylinder valve or pressure reducing valve where the change from liquid to gas involves rapid expansion and a considerable heat absorption. (One pound of liquid CO_2 changing to gas requires a heat input of 180 Btu.) This trouble can be prevented by the provision of a suitable heating coil (as in the Pontifex valve) or some form of heating device applied to the reducing valve body and connections.

Failure to obtain a steady flow of carbon dioxide is usually responsible for unsatisfactory hardening or bad stripping from the corebox. The appearance of a whitish frosted appearance on the surface of core or mold is a sign of excessive application of gas, but also distinguishes a CO_2-hardened core which has been stored for a considerable time. Such a surface gradually becomes friable and difficult to handle without damage.

Other causes of friable edges and low surface hardness on gassed cores are 1) the use of an unsuitable silica sand with high clay or silt content, 2) drying out of the mixed sand before use, 3) excessive additions of coal dust or other fine dry mineral powders.

Advantages and Disadvantages—It will be fairly obvious that on a purely cost basis this process cannot compete with normal green sand molding methods. It can, however, compete favorably with both dry sand and oil sand practice—the first on account of the considerable saving in time, labor and fuel costs; the second because of using a relatively low-priced bond selling at about 4d (less than 5 cents) per pound in bulk quantities. There also is a saving in oven time as well as fuel consumption, against which must be put the cost of carbon dioxide used and any special gassing equipment installed.

Consumption of gas per unit weight of sand cured varies from less than 1 per cent (1 lb per hundred) for large cores and molds to as high as 3 per cent in small intricate cores. At the average price of about 5 cents per pound of CO_2 this means a cost of 5 to 15 cents per 100 pounds of cores produced.

Some of the less obvious advantages of the process include:

1. Improved accuracy of castings, particularly in wall thickness of cored castings.
2. Considerable saving in production time due to reduced number of wires, core grids, sprigs or nails required for supporting sand.
3. Elimination of specially made drying shells for cores.
4. Greatly reduced fumes at pouring and knockout stations.
5. Reduction in scrap castings caused by blows, scabbing and core distortion.

Some problems remain to be answered. One is, Is the reuse of silicate-bonded sand feasible? One answer to this is wet sand reclamation. Another question is, What effect will CO_2 process sand have on a sand system over a period of years? This has yet to be shown but the best course at the moment is to use only new sand for cores and facing; then the presence of silicate bond or sodium carbonate in the backing sand is of little moment.

However, since it has recently been proved that an increase in the alkalinity of foundry molding sands can be beneficial both to the molding characteristics and casting finish, the introduction of CO_2 process sand may even prove of indirect benefit over a period of time.

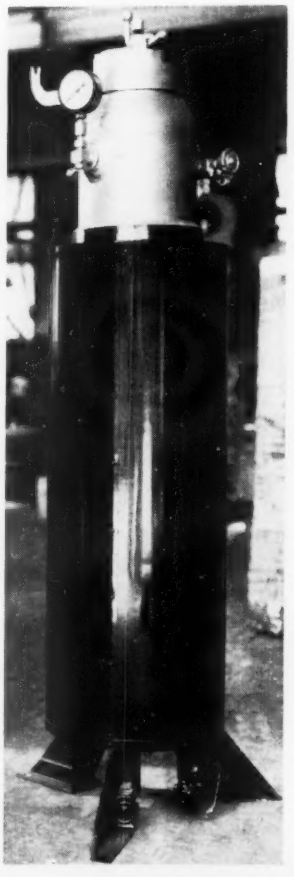


Fig. 17—Solid CO_2 may be used with a suitable gasifier like this unit, for use of 25-lb blocks. Gasifier has 100-lb capacity

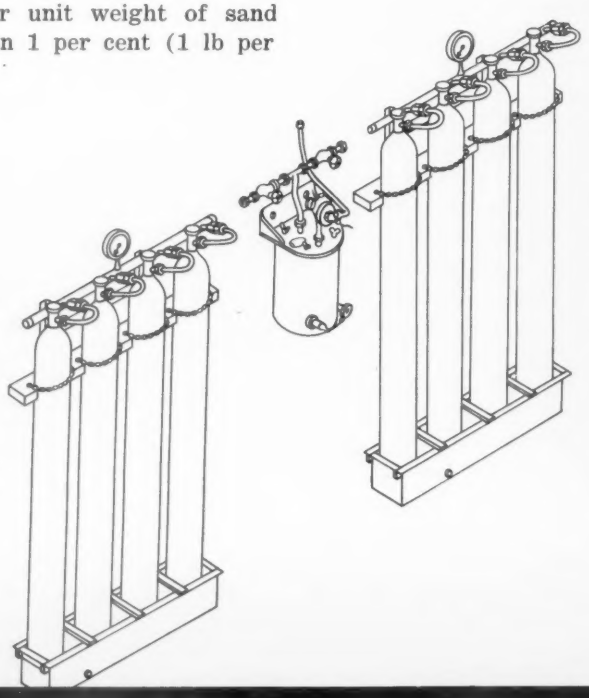
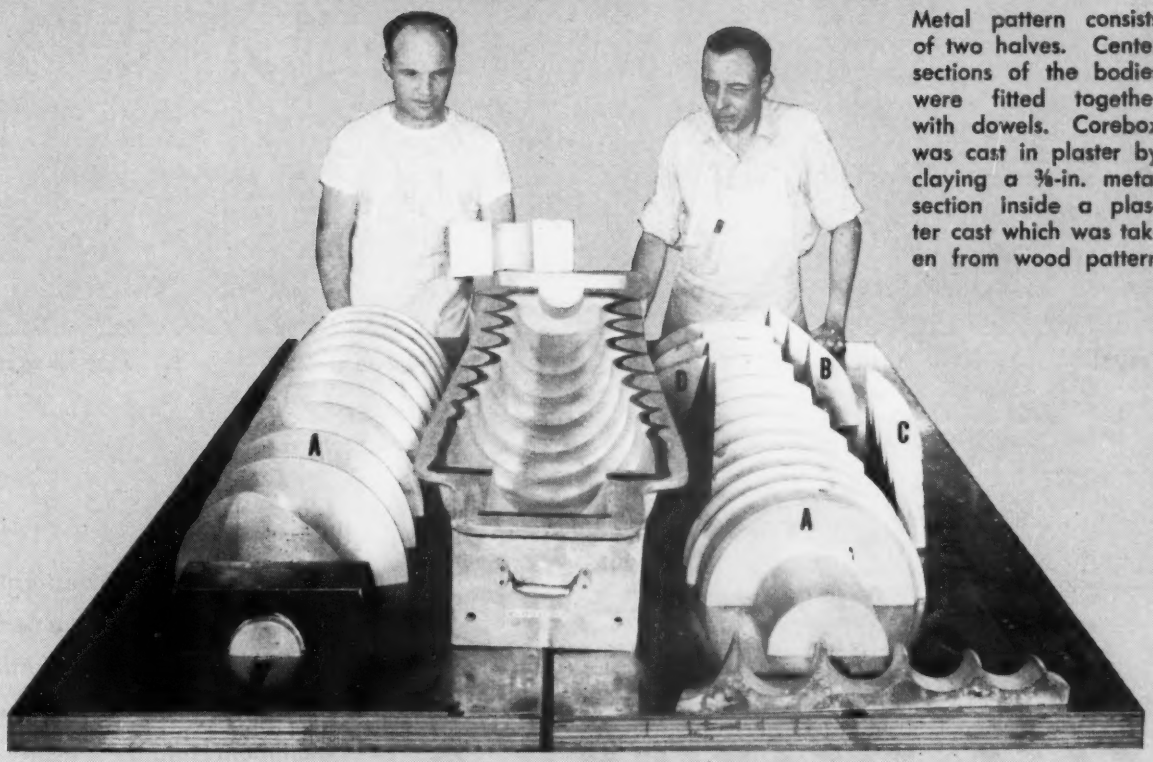


Fig. 16—For production use a number of cylinders can be arranged to feed simultaneously through a manifold into an intermediate pressure chamber from which connections lead to individual coremakers' benches or to other gassing points



Metal pattern consists of two halves. Center sections of the bodies were fitted together with dowels. Corebox was cast in plaster by claying a ⅜-in. metal section inside a plaster cast which was taken from wood pattern

MOLDING SIMPLIFIED

...By Change in Pattern

By WILLIAM FERGUSON
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THE pattern equipment pictured here was made to simplify the molding of a stainless steel extractor screw. Casting is 43½ in. long and 14 1/16 in. in diameter. The metal thickness is ⅜ in. and weight is 410 lb. The screw has a double thread with a variable pitch which varies from 5¼ in., with a depth of 2¾ in. on the large end, to 2⅝ in., with a depth of only ¼-in. on the discharge end. Finish was added to the diameter.

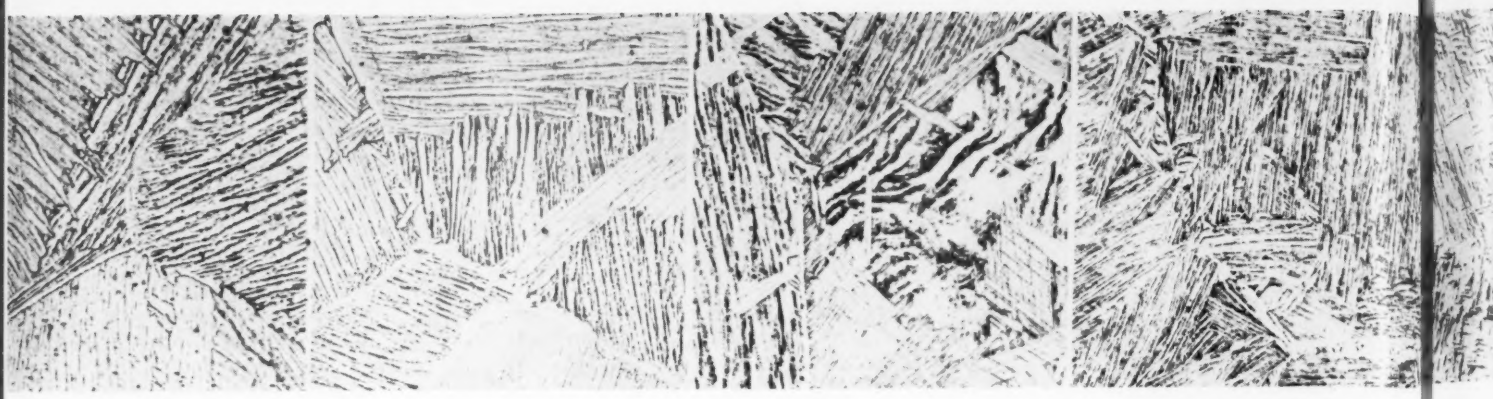
Initial pattern equipment consisted of a split metal pattern and one-half contoured corebox. The present pattern equipment was designed to permit the withdrawal of the central part of the screw A vertically from the mold, leaving the four loose pieces of B, C, D, E in the mold. The loose pieces were then drawn towards the center of the mold slightly and out. This produces a very clean and accurate mold with a flat parting.

Pattern consists of two metal halves. The center sections of bodies of the halves were fitted and doweled together. The eight loose pieces then were fitted and bolted to the bodies and the entire assembly hand finished with the exception of the core prints, which were cast with a finish allowance. Core prints were centered and the entire pattern set between the lathe centers. Core prints were turned to size and the ends were faced off to the proper length.

The bodies of the pattern are mounted on cope and drag boards to accommodate a 30 x 64 in. flask. The boards are made of 2 in. plywood bound on sides and back with 10-gage sheet steel and faced with ¼-in. aluminum plate on the pattern side. The center portion of the pattern is permanently bolted to the board. Loose pieces B, C, D, E are held in position against the pattern with two ⅜-in. pins fitted into the metal facing of the boards.

The corebox was cast in plaster by claying a ⅜-in. metal section inside a plaster cast taken from the master wood pattern.

A large telltale on the core print locates the core lengthwise in the mold.



4.2% Al—0.0% Si | 4.23% Al—0.095% Si | 4.15% Al—0.44% Si | 4.13% Al—0.91% Si

Mechanical Properties of CAST TITANIUM—ALUMINUM—SILICON ALLOYS

Purpose of this investigation was to determine the effect of silicon on the mechanical properties of cast titanium-aluminum alloys. Silicon additions up to 1 per cent were made to both 4 and 6 per cent aluminum-titanium alloys. In both series of alloys, an increase of about 4000 psi was realized for each 0.1 per cent of silicon added to the alloys

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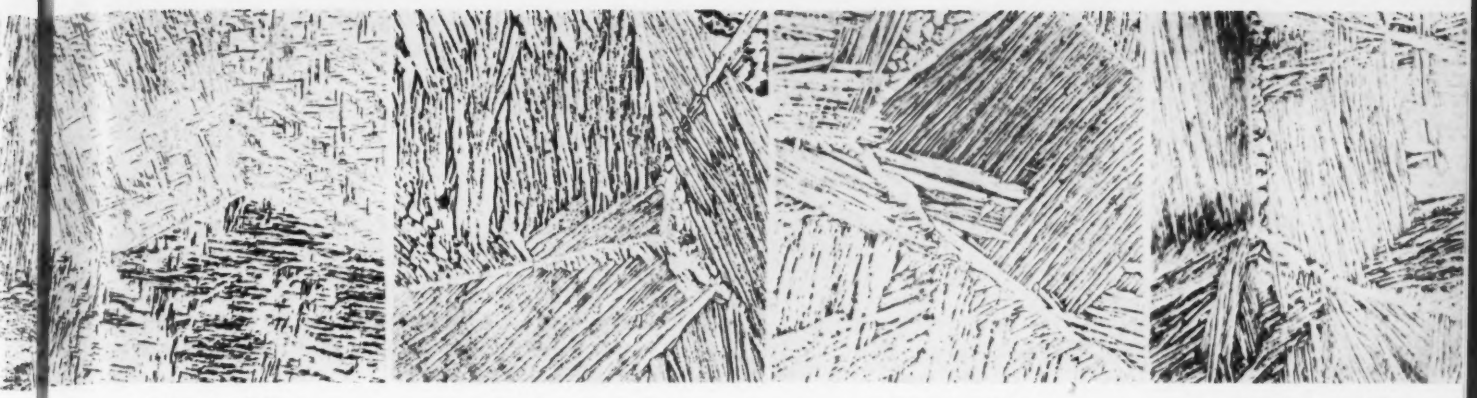
THE addition of aluminum to titanium produces high-strength alpha alloys. However, when an aluminum content of about 6 per cent is exceeded, the alloys are extremely difficult to machine or fabricate in any manner.[1] Consequently, the maximum amount of aluminum that may be added to titanium to yield a useful alloy which can be worked or machined, is 6 per cent.

An alloy of 6 per cent aluminum has an ultimate strength in the as-cast condition of only 108,000 psi. If higher strengths than this are required in the as-cast condition, other elements must be added. If beta stabilizing elements are added, i.e., Fe, Cr, Mo, etc., then the all-alpha structure is changed to an alpha-beta structure. For certain applications, such as welding or high temperature, it is desirable to have a completely alpha structure. One element that can be added in small quantities to produce a fully alpha structure is silicon.[2]

In a previous investigation by Antes and Edelman,[3] an appreciable increase in cast tensile strength was obtained with the addition of silicon to titanium. The ductility of these cast binary titanium-silicon alloys was good for silicon contents up to approximately 1.25 per cent. Alloys of higher silicon contents (1.8 to 3.0 per cent) were extremely brittle. It was felt that small amounts of silicon might prove beneficial in increasing the tensile strength without seriously reducing the ductility or machinability of titanium-aluminum alloys. Thus, two groups of alloys were made for this investigation. Group I consisted of a series of four alloys which had a base composition of 4 per cent aluminum with silicon additions varying from 0 to 1 per cent. Group II consisted of a series of alloys made in the same silicon range, but having a base



6.36% Al—0.0% Si | 5.97% Al—0.09% Si | 6.17% Al—0.34% Si | 5.87% Al—0.90% Si

Fig. 2—Etched specimens of cast titanium-aluminum-silicon alloys, at 100X. The etchant employed was composed of 60 ml ethylene glycol, 25 ml HNO_3 and 1 ml HF

composition of 6 per cent aluminum. Tensile tests, impact tests and hardness measurements were made for all the alloys.

Alloy Fabrication—All the alloys were made by double melting. These alloys were first made in the form of a 2 to 3-lb pig. These pigs were then melted in a bottom pour arc type furnace[4] and cast into an open box type graphite mold (Fig. 1). The castings were 6 in. square by ¾ to 1 in. thick. This size casting provided an adequate number of specimens from a single heat for all the necessary tests. All of the alloys were made from du Pont "Process A" titanium sponge*, 30-80 mesh silicon metal (99.7-99.9 per cent pure), and commercially pure aluminum (99.54 per cent Al). The double melting cycle was employed to increase alloy homogeneity and decrease the amount of volatiles in the metal. The complete melting and casting procedures have been discussed by O. W. Simmons et al[4] in a previous report.

Mechanical Tests—The tensile specimens used in this investigation were machined, standard 0.357-inch-diameter tensile bars, modified slightly to provide shoulders rather than threads for holding the specimens in the tensile testing machine. A 1.4-in. gage length was employed, using a microforming-type, averaging extensometer. The tensile tests were made on a Baldwin-Southwark hydraulic machine, using a crosshead speed of 0.005 inch per minute and a load range of 20,000 pounds.

Standard "V" notch Charpy specimens were tested at −76°, 26°, and 100° C with a Riehle impact testing machine having a capacity of 220 ft-lb.

Hardness measurements were made with a brinell hardness tester (3000 kg load). Two hardness measurements were made on each of the cast alloys.

Specimens of each alloy were polished and etched, and photomicrographs were made (Fig. 2). The polishing and etching procedures are similar to those used by Simmons and Edelman.[5]

Tensile Properties—The yield and ultimate tensile strengths increase practically lineally with the addition of silicon for both the 4 and 6 per cent aluminum-base alloys. An ultimate tensile strength of 146,100 psi was observed for a 5.87 per cent aluminum-0.9 per cent silicon alloy. The yield strength of this alloy (0.2 per cent offset) was 138,500 psi, 95 per cent of the ultimate tensile strength (Fig. 3). The highest tensile strength observed in this investigation, for the alloys tested from Group I, was obtained from the 4.13 per cent aluminum-0.91 per cent silicon alloy. The ultimate tensile strength of this alloy was 126,400 psi with a yield strength of 116,000 psi.

The elongation of the 4 per cent aluminum base alloys decreased from 16 per cent (0.0 per cent silicon) to 10 per cent (0.91 per cent silicon). The elongation of the alloys containing 6 per cent aluminum decreased from 12 per cent (0.0 per cent silicon) to 7.5 per cent (0.90 per cent silicon).

The complete tensile data, including yield and ultimate tensile strength, per cent elongation (1.4-in. gage length), and reduction in area, are listed in Table I.

Impact Properties—The Charpy impact energy,

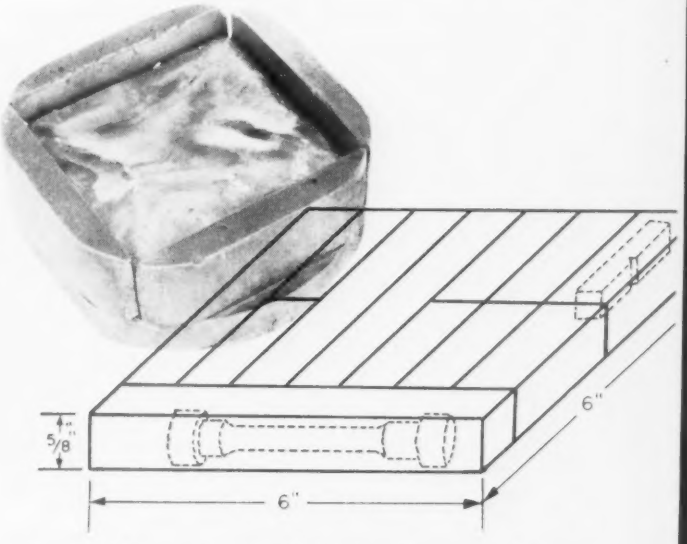


Fig. 1—View at top left shows the cast plate and mold. Drawing shows the test bar location

*Composition in per cent of Process A sponge from E. I. duPont de Nemours & Co. Inc. is: Ti 99.5, Fe 0.06, N 0.009, C 0.02-0.04, O 0.06-0.10, H 0.006-0.009, Mg 0.01-0.05, chlorides 0.06.

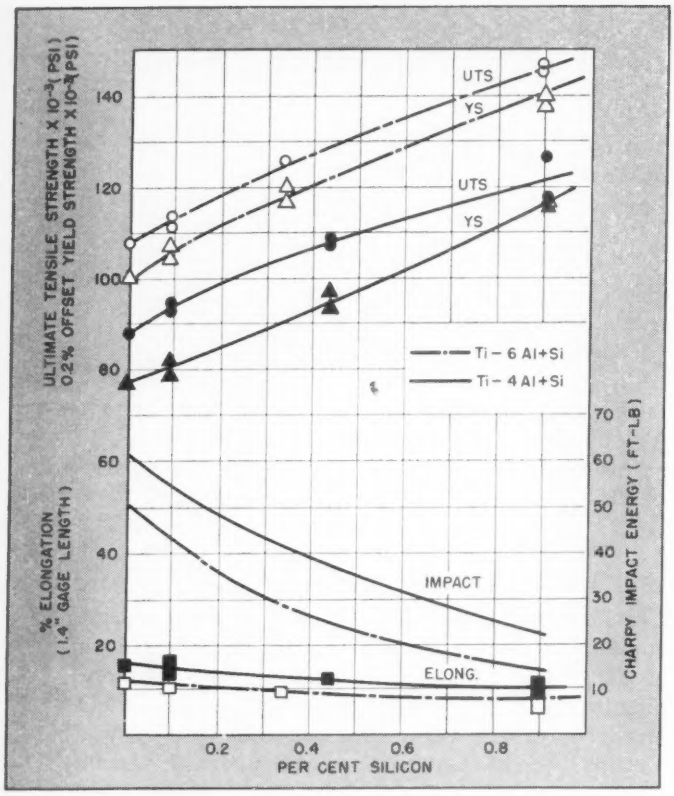


Fig. 3—Chart shows tensile and impact properties of cast Ti-Al-Si alloys at room temperature

as a function of testing temperature, for each alloy is shown in Fig. 4. As the testing temperature was increased, the impact energy increased. However, there are no sudden changes in the slope of the curves over the temperature range investigated. Practically all the curves are approximately straight lines. The impact energy vs. per cent silicon curves is shown in Fig. 3. As the silicon content was increased for both Groups I and II alloys, the impact energy decreased. These curves also are relatively smooth and have no abrupt changes. The highest energy absorbed at room temperature for the ternary alloy of this investigation was 60 ft-lb (4.23 Al-0.095 Si). All impact data are listed in Table II.

Hardness—The 4 per cent aluminum-base alloys increased in hardness from approximately 220 bhn (3000 kg load), for the alloy with no silicon, to 375 bhn for the alloy containing 0.91 per cent silicon. The 6 per cent aluminum series showed a similar increase in hardness (249 bhn to 305 bhn) over approximately the same silicon range (Fig. 5).

Microstructure—Photomicrographs of the alloys are shown in Fig. 2. The structure of all the alloys is single phase acicular alpha.

Discussion—A tensile strength of approximately 150,000 psi can be obtained from a cast 6 per cent aluminum-1 per cent silicon-titanium ternary alloy. This alloy has an elongation of about 7 per cent (1.4-inch gage length). In order to obtain a cast binary titanium-aluminum alloy which would be as strong as this, it appears that slightly more than 10 per cent aluminum would have to be added to titanium.[6] However, binary alloys of titanium containing 7 or more per cent aluminum are extremely difficult to machine and are quite brittle. The brittleness and machining difficulties have minimized the practicality of these alloys.

Quantitative machinability tests were not made in this investigation. However, the difference in machinability between the high-aluminum binary alloys (7 to 10 per cent Al)[6] and the high-strength ternary-aluminum-silicon alloy (5.87 Al-0.90 Si) was great enough to enable the machinist to easily distinguish between the alloys. The ternary alloy was sawed and turned down on the lathe more easily than binary alloys containing 7 to 10 per cent aluminum. Although less machining is done on castings than on other fabricated forms, an easily machined alloy is beneficial for the production of cast parts. Therefore, for a given strength and ductility level, a machinable alloy would be preferable to a nonmachinable alloy in the casting process.

The tensile and impact curves for the alloys tested in this investigation are shown in Fig. 3. From these curves it can be seen that for both groups of

TABLE I—Tensile Properties of Cast Titanium-Aluminum-Silicon Ternary Alloys

Specimen No.	Per Cent Alloy Added	Per Cent Alloy of Plate	Ultimate Tensile Strength, psi	Yield Strength (0.2% offset) psi	Elongation, Per Cent (1.4" Gage)	Reduction in Area, Per Cent	Hardness of Plate (bhn 3000 Kg)
			GROUP I				
A	.....	4.1 Al	88,000*	77,000*	16*	...	220*
E_3	4 Al–0.1 Si	4.23 Al–.095 Si	93,300	78,900	16.0	30.9	212
E_4			93,900	81,000	13.1	26.7	212
F_3	4 Al–0.5 Si	4.15 Al–.44 Si	108,300	94,400	12.9	25.8	248
F_4			107,700	96,500	12.4	24.7	241
G_3	4 Al–1.0 Si	4.13 Al–.91 Si	126,400	116,100	9.0	22.2	277
G_4			118,400	117,800	10.3	23.6	269
			GROUP II				
B	.....	6.0 Al	108,000*	96,000*	12*	...	249*
H_3	6 Al–0.1 Si	5.97 Al–.09 Si	111,000	103,500	11.1	24.1	241
H_4			113,000	106,500	11.0	17.5	255
J_3	6 Al–0.5 Si	6.17 Al–.34 Si	125,700	118,200	9.4	22.3	277
J_4			125,800	119,600	9.5	20.7	277
K_3	6 Al–1.0 Si	5.87 Al–.90 Si	146,100	137,100	7.1	16.8	302
K_4			145,700	140,000	7.7	17.3	311

*Average values taken from Reference 6.

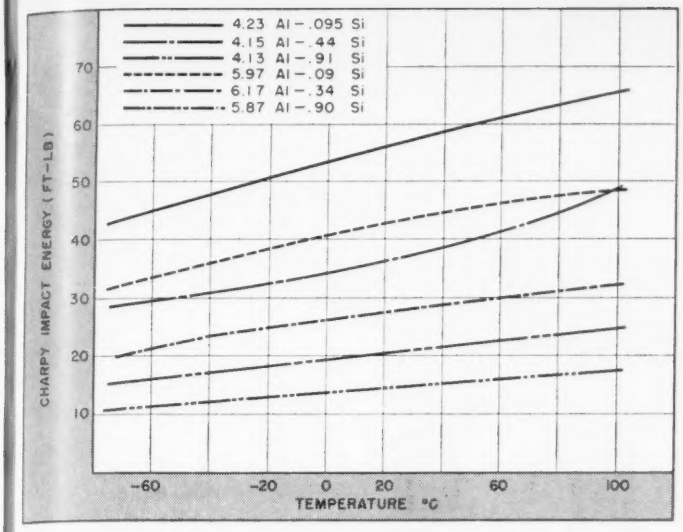


Fig. 4—Charpy impact energy vs testing temperature for cast titanium-aluminum-silicon alloys

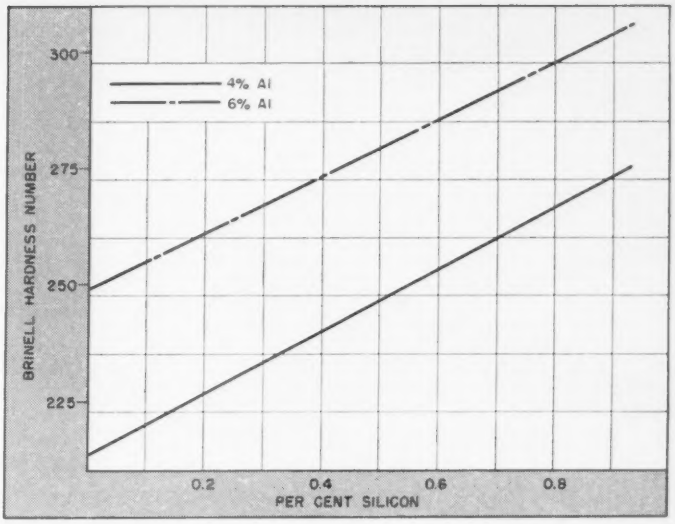


Fig. 5—Brinell hardness (3000 kg) vs silicon content for two series of cast Ti-Al-Si alloys

alloys an ultimate tensile strength of 120,000 psi can be obtained. To reach this strength with an alloy containing 4 per cent aluminum, about 0.85 per cent silicon must be added. However, it is necessary to add only 0.22 per cent silicon to the 6 per cent aluminum alloy to obtain the same strength. The yield strengths and elongation of these two alloys are about the same, but the impact strengths are different (Fig. 3). The 6 per cent aluminum ternary alloy has an impact energy of 35 ft-lb, while the 4 per cent aluminum ternary alloy has an impact energy of only 23 ft-lb. Therefore, the higher aluminum and lower silicon content alloy should be used if the maximum Charpy impact resistance is to be realized at this strength level. A similar comparison can be made at other strength levels for the alloys studied in this investigation.

The addition of silicon, up to 1 per cent, to 4 and 6 per cent aluminum-titanium alloys did not alter the microstructure very much. The 4 and 6 per cent aluminum binary alloys have an all-acicular alpha structure. All the ternary alloys of this investigation had a similar structure (Fig. 2). An all-alpha microstructure is particularly desirable if the alloy is to be welded or used at an elevated temperature.[7]

TABLE II—Charpy Impact Properties of Cast Titanium-Aluminum-Silicon Alloys at Various Testing Temperatures

Alloy (Per Cent)	—Enery at Bath Temperature (ft lb)— −76° C	25° C	100° C
4.1 Al–0.0 Si	.....	60*	.....
4.23 Al–0.095 Si	42, 43	55, 60	65, 65
4.15 Al–0.44 Si	28, 29	38	47, 51
4.13 Al–0.91 Si	15, 15	.....	23, 25
6.0 Al–0.0 Si	.....	50*	.....
5.97 Al–0.09 Si	30, 32	40, 47	43, 54
6.17 Al–0.34 Si	20, 20	28, 28	31, 33
5.87 Al–0.90 Si	10, 11	13, 15	17, 17

*Average values taken from Reference 6.

Conclusions—

1. Useful high-strength, all-alpha casting alloys can be produced by the addition of silicon and aluminum to titanium.

2. The addition of silicon increases the tensile strength appreciably for both 4 and 6 per cent aluminum-titanium alloys, while the ductility is reduced only moderately.

3. As the aluminum content is decreased and the silicon content is increased (to maintain a given strength level), the impact strength of the ternary titanium-aluminum-silicon alloys decreases.

4. Silicon in amounts up to and including approximately 1 per cent can be added to 4 and 6 per cent aluminum-titanium alloys without changing the all-acicular alpha cast structure.

Acknowledgements—The authors wish to express their sincere appreciation to H. Markus, director, Metallurgical Research Laboratory, and H. Rosenthal, chief, Foundry Research Division, Pitman-Dunn Laboratories, for providing the assistance required in carrying out this study; to H. R. McCurdy who made the alloys and J. D. Corrie who aided in the testing.

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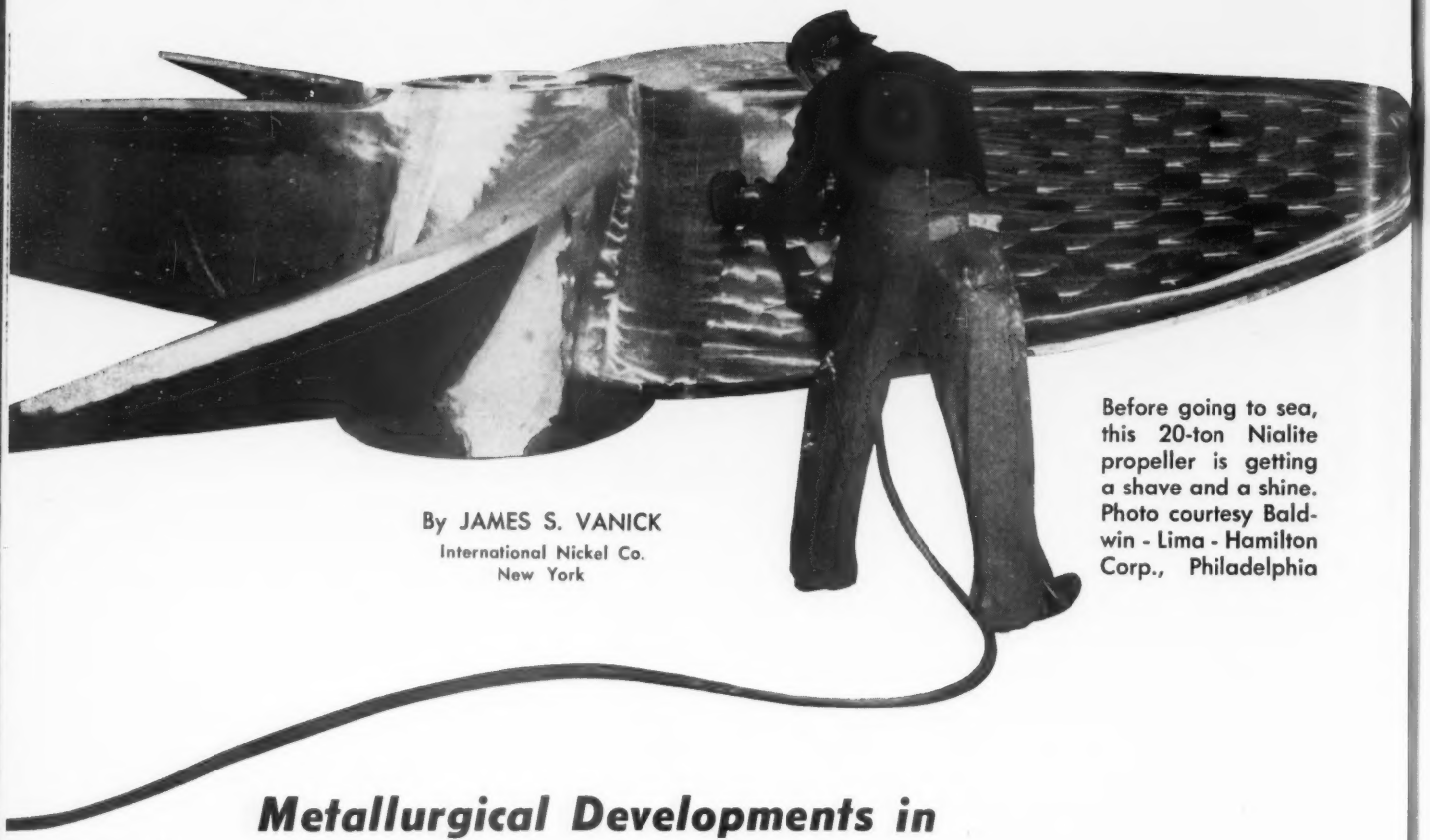


Before going to sea, this 20-ton Nialite propeller is getting a shave and a shine. Photo courtesy Baldwin - Lima - Hamilton Corp., Philadelphia

By JAMES S. VANICK
International Nickel Co.
New York

Metallurgical Developments in

COPPER-BASE ALLOYS

Foundries producing copper-base alloy castings must be sure that they are keeping up with developments in operating practice and metallurgy. In this article the author examines the status of many copper-base alloys

IT'S time for foundries producing copper-base alloy castings to make a self analysis to be sure that they are keeping up with developments in both operating practice and metallurgy.

Shop equipment rapidly becomes obsolete with the changes in practice that are occurring with surprising frequency. The high cost of labor, equipment and materials makes modernization imperative. Metallurgical developments in recent years have seen improvements in available alloys for various applications. There has also been some increase in competition from other materials.

Plastics Find Market—As the demand for corrosion-resisting castings increased in the face of a fixed supply of available metal, manufacturers of various products were compelled to reach for substitutes. The plastics industry has met some of these requirements and invaded the nonferrous foundry field with pipe fittings and valves capable of handling corrosive liquids up to temperatures of about 140° F. The plastics have been improved to develop a strength of about 10,000 psi; while this value is approximately one-third of the strength of the weakest copper base alloy, it nevertheless moves into the field to take over some of the less rigorous applications.

The opportunity to produce plastics with a smooth surface and in finished dimensions, including threads, makes it imperative for nonferrous foundrymen to look toward die casting, permanent molds and other precision casting methods to match the invasion of the competitive products. Developments in heat-resisting alloys may make it possible to pour nonferrous metals under 2250° F into molds capable of accepting such temperatures for long operating periods.

Sealants Are Useful—The impregnation of expensive pressure castings with sealants such as the plastics or resins, deserves the support of both the consumer and producer to arrive at a more profitable level of co-operation in the application of castings. The liberal safety factors employed in the use of castings should permit the reclamation of castings suffering from minor leakage wherever the extent of the defect can be determined and its repair accomplished. The sealants

commonly used are, in general, corrosion resistant and applicable for use in temperatures up to 150° F.

Test Bar Design—Some notable progress has been made in the design and standardization of test bars[1] as well as in the use of chill test fracture blocks[2] for gaging the quality of the metal. Unfortunately, these tests are usually used *after* trouble has been encountered and not *before*. Back in 1950, Ames[3] showed that tin bronze poured hot gave good pressure castings; poured cold it gave good test bars.

The British proposal to apply an aluminum wash to molds for tin bronzes is just beginning to receive attention. Fischer's[4] work on improving soundness in leaded tin bronzes by employing pitch bonded facing is also receiving careful attention. Plastic bonded sands are similarly under surveillance.

Keeping in advance of this progress, the foundrymen's associations, both technical and commercial, have done much to encourage control testing in the foundry to 1) determine the quality of the metal prior to casting, and 2) test the castings to establish quality control. In many cases, these requirements have become necessary through the higher cost which the products command. From these experiences, the nonferrous foundryman is bound to make further progress toward refinements in practice that lead to substantial improvements.

Types of Alloys—Copper-base alloy castings lend themselves to a five-group classification which can be conveniently listed as shown in Table I. There have been relatively few changes in the first four classes shown. Within each of these groups, a dozen modifications occur in which the percentage of each alloy ingredient is subject to change.

Among the bearing metals (No. 3), the copper-antimony-lead alloys of the following type have been lying dormant and deserve to become more widely known: Pb 10 per cent, Ni 8 per cent, Sb 1 per cent, Zn 1 per cent, Sn 0-2 per cent, Cu balance. These alloys are easy to cast and machine. At high speeds and light loads they resist seizure and wear as well as or better than the traditional 80-10-10, and they do so for less cost.

Basically, the copper and tin contents define the character of the bronzes. Lead provides the machining and bearing quality requirements, and zinc acts as a diluent of the copper or copper-tin base. The mechanical properties, in general, decrease with increasing lead and zinc contents.

Modifications to the leading members in each one of the family of alloys has, in general, been forced into being through the unavailability of certain ingredients or, conversely, through the abundance and low cost of other ingredients. The situation has invited a downgrading of specifications to the point where the risk of satisfactory performance is involved. This risk will not be eliminated until the innumerable alloys have been re-examined and re-studied from the standpoint of their long-term performance, and specifications written that can assure desirability and adequate performance.

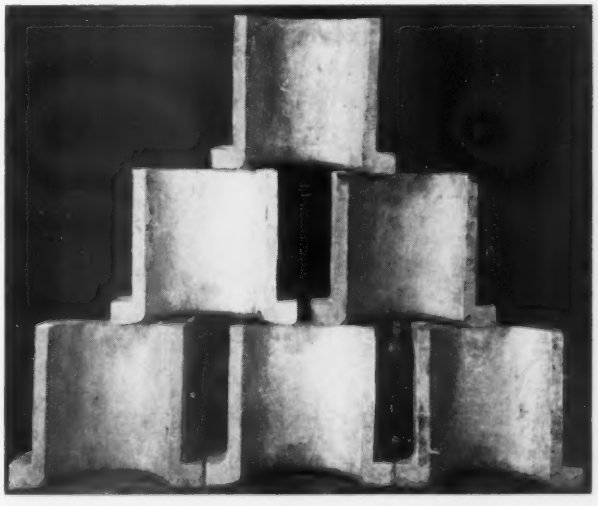
In a general survey of the corrosion resistance of copper-base alloys to common corrosives, the high zinc brasses are usually most rapidly attacked. Improvement develops as the zinc content is reduced and tin, nickel, silicon and aluminum move in to hold the line. Inability to employ fully the tin and nickel alloyed copper over the past decade is inspiring a trend toward specifying larger percentages of these important ingredients for long-term improvement.

Corrosion and wear resistance exert pressing influences toward upgrading the copper-base alloys. The initial evidence of these pressures is felt in the readjustment of specifications, mostly in the direction of higher quality alloys. One of the most promising alloys brought into sharp focus during the year is the 5 per cent nickel - 5 per cent tin bronze which cuts across the field of compositions in the tin bronze group outlined above. It provides a high-grade, corrosion-resistant composition which retains all of the excellent features of each family group, and, in addition, provides versatility through its ability to be heat treated by tempering or quenching and tempering into stronger or harder forms. ASTM Specification B292 54T defines the top grade member of this alloy:

Cu	Ni	Sn	Zn	Tensile Strength, psi	Yield Point, psi	Elong., %
Bal.	5	5	2	45,000	20,000	25
		(Heat treated)		75,000	50,000	5

It excels the best challenger of the tin bronze family, as indicated in Table I. It is suitable for all services except elevated temperature work, where its susceptibility to heat effects at temperatures above 450° F limits its applicability.

Miscellaneous Group—While attempts to standardize the nonferrous alloys have met with some success, there is a fringe of 10 to 20 per cent of the total output in the miscellaneous group (No 5, Table I) which merits considerable attention. Most of the recent progress has occurred within this



Rolling mill neck bearings are for use in a 14-in. mill. They are made of nickel-alloyed bronze

Bronze ring gear is mated with 4340 steel worm for use in steel rolling mill. Cu 88%, Sn 10%, Ni 2%. Photo courtesy of DeLaval Steam Turbine Co., Trenton, N. J.

group. There is good reason to feel that most of the future progress will develop there also. This group comprises the manganese, aluminum and silicon bronzes, as well as the nickel silvers.

The silicon manganese and aluminum bronzes are commonly employed for high-strength applications. They can develop 80,000 to 120,000 psi with 5 to 30 per cent elongation. In terms of economics, the manganese bronze with its 60 per cent copper-40 per cent zinc base composition is the cheapest. Improvements to it have been made by cross-breeding it with aluminum bronze until zinc contents have been substantially reduced. These changes usually contribute an improved resistance to corrosion. Nickel additions of 1 per cent are common in manganese bronze; 2 to 3 per cent is frequently used, and 6 to 8 per cent is known to develop a substantial improvement, particularly in sea water. Rotating disks 8 in. in diameter are used to measure velocity effects. In general, the damage increases progressively from center to edge so that corrosion rates are relative. Table II shows typical test results.

TABLE I—Alloy Classifications

	ASTM Spec. No.	Tensile Strength, psi	Yield Strength, psi	Elongation, %
1. Constructional group: Example, 88-10-2 type	B143	40,000	18,000	20
2. Pressure Castings: Example, 85-5-5-5 type	B145	30,000	14,000	20
3. Bearing Metals: Example, 80-10-10 type	B144	25,000	12,000	8
4. Yellow Brasses: Example 15 to 40% zinc type	B146	35,000	12,000	25
5. Miscellaneous: Manganese, silicon and aluminum bronzes and nickel alloys ...	....	.....	.....	..

The maximum improvement in manganese bronze has not been quite able to achieve the degree of improvement obtained by alloying the aluminum bronzes. Laboratory tests have, for some time, pointed to advantages which aluminum bronze possessed, but it took a recent crisis in propeller materials to initiate a move from manganese to aluminum bronze. In the process, the existing aluminum bronze specifications were modified to employ less aluminum, less iron and more nickel and manganese, resulting in a product which in the as-cast condition develops a high order of strength

TABLE II—Typical Corrosion Test Result—Manganese Bronze

(Sea water—60 days—velocity 40 ft per sec.)

	Ni	Cu	Zn	Al	Fe	Mn	Weight Loss, MDD*
Ni-Mn bronze ..	2.05	Bal.	44	1.0	.30	.70	338
	3.08	Bal.	36	1.1	.62	.40	215
	5.16	Bal.	34	1.5	.82	.54	90
	8.13	Bal.	39	.26	2.94	.03	20
Ni-Al bronze ...	5.00	Bal.	..	10.07	3.92	1.44	40
	4.94	Bal.	..	10.50	2.74	3.32	26

*Milligrams per square decimeter per day.

and ductility along with a high level of corrosion resistance (Table III). A bendable, weldable, machinable alloy replaced the hard, brittle and difficult to fabricate product which existing specifications provided. Such improvements are certain to occur with increasing frequency.

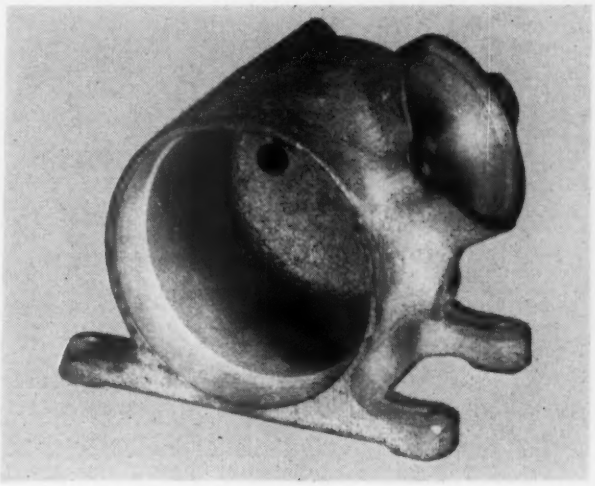
Silicon bronzes are open to similar advancement. Progress toward improving their density, reducing their susceptibility to porosity, and improving their toughness and weldability is under way. There are opportunities for alloying them with congenial elements, such as nickel, in which event the demarcation between cupro-nickel and silicon bronze disappears.

The cupro-nickels have passed through a period of readjustment, in the course of which the 70 per cent copper - 30 per cent nickel bellwether of the flock has been supplemented with the 80-20 and 90-10 varieties. The 90-10 alloy fades out of the white color into a brassy yellow but retains a large measure of the basic advantages in corrosion resistance that characterize this alloy. In its debased nickel composition and correspondingly lowered cost, the 90-10 alloy becomes a brisk contender for tin bronze applications that require a high order of corrosion resistance.

The alloy-free cupro-nickels possess mechanical properties that equal or slightly excel those of the best tin bronzes. With the aid of alloys such as silicon, aluminum, manganese and iron, it becomes possible to adjust the composition to develop tensile strengths in the 90,000 psi range with ductilities in the 20 per cent elongation range. They develop a high stiffness or elastic modulus for which these alloys are useful as rolls, etc. in the paper, textile and food products industries. Industrial applications in the conveying, food handling, chemical process, dairy and packaging equipment fields have survived the rigors of competition and alloy shortages to maintain the position of the cupro-nickels in foundry output.

The nickel-silver family has suffered from debasement during the past decade. Prevalent specifications include compositions ranging from 10 per cent up to 25 per cent nickel. The addition of 20 per cent nickel to a yellow or red brass provides the foundryman with a product that casts like brass and produces a solid white metal at low cost without need to resort to plating. Plaster, precision and shell molding methods as well as improvements to older practices have helped to obtain slick surfaces and save polishing costs.

The nickel contribution toward corrosion resistance should ultimately restore the high standing of this alloy for plumbing goods and household hardware. Its position in the ornamental and architectural field has been shared with other competing materials, but its performance in such fields is supported by decades of satisfactory service in applications which it still serves usefully. The principal progress in its field will consist of upgrading its quality to obtain the whiteness which often determines its selection. Its continued application as railroad Pullman car hardware has maintained a link by means of which its restoration to specifications in the architectural, ornamental, hardware and plumbing fields is assured.



Pressure casting is for a dental machine part. The bronze alloy used is the standard 85-5-5-5 alloy modified by the addition of 1% of nickel

A number of specialty alloys which are cross-bred products of the cupro-nickel, aluminum bronze and silicon bronze families have emerged to provide high electrical conductivity or resistance to corrosion and fatigue, or similar special properties.

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TABLE III—As-Cast Mechanical Properties Of Nickel-Aluminum Bronzes

	Specified				Obtainable			
	Tensile Strength, psi	Yield Strength, psi	Elongation, %	Bhn	Tensile Strength, psi	Yield Strength, psi	Elongation, %	Bhn
ASTM B148 (9D) Existing Spec.	90,000	40,000	6	190	95,000	45,000	10	200
Nialite Propeller Spec.	80,000	40,000	15	180	90,000	45,000	25	180

Machine operator hand-dipping measured amount of aluminum from an open-type, gas-fired furnace prior to ladling metal into injection cylinder

New Plant Helps Promote

DIE CASTING QUALITY

By KENNETH L. MOUNTAIN
Assistant Editor

RECENT opening of a new $400,000 die casting plant in Bedford Heights, O., culminated 18 years of experience in the die casting industry for Thomas J. Lester, president and chief engineer of Lester Castings Inc.

In 1933 Mr. Lester's father, Nathan Lester, one of the early pioneers in the die casting industry, organized Lester Engineering Co. to manufacture die casting machinery. Tom Lester grew up in a die casting environment, apprenticed under his father, and was always surrounded by men responsible for the rapid growth of the industry.

Seven years ago he organized Lester Castings Inc., which now has expanded into a new, modern plant covering about 17,500 sq ft and containing the latest equipment and facilities for engineering, tooling and die casting aluminum, zinc and magnesium products for industry. The firm supplies manufacturers of metal products, machinery and electrical machinery, appliances and parts for the automotive, aviation and allied industries.

Some of the castings produced are antenna rotor housings and gearing mechanisms, threaded plugs, aircraft fittings, motor end bells, base stands for electric fans, corner brackets for storm doors, gears, impeller wheels, lock and door handles and flanges.

The company's management personnel is a staff of experts and engineers in their respective fields. It averages 15 years or more die casting experience, even though the industry itself has come into its own only in the last 30 years. The staff has been

All dies used are engineered, designed and made in the tool and die shop by expert craftsmen who average 17 years' experience in die casting work

After the casting operation, operator removes and inspects casting, then lubricates and cleans die before repeating the cycle

integrated into a production team that imparts its experience, engineering skill, design and production ability into each casting produced. Teamwork is the essence of success in this efficient, self-contained operation.

All the plant facilities are in a modern, one-story brick building, subdivided into the following areas: Foundry, tool and die shop, tool crib, inspection department, trimming and finishing department, shipping office, employees' lunch room, washrooms, engineering and drafting offices, plant manager's office, president's office, general business office and reception room. Second-floor storage space is provided over the tool crib and employee rest rooms.

Overhead artificial lighting combined with generous amounts of natural light filtered through large window areas help promote work accuracy and reduce accident hazards. Smoke and fumes are kept to a minimum as a constant supply of fresh air is supplied through the ventilating system. In the foundry section two 16-inch fans, each driven by a 3-hp motor, change the air completely every four minutes.

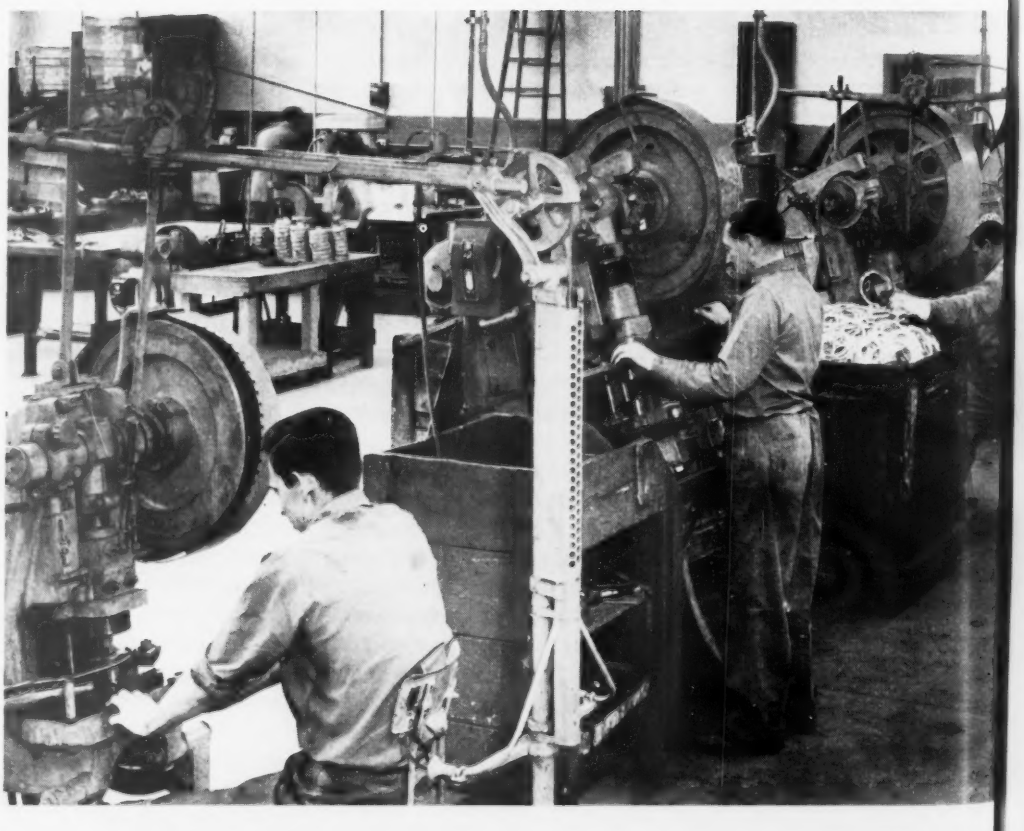
Various departments are arranged to provide a straightline flow from receipt of goods to shipment of finished castings. Handling of materials and rehandling of castings in process is kept at a minimum. Preliminary raw material handling is limited to a short movement of ingots from delivery trucks to pallets for storage until required for melting. Storage space is provided in the foundry adjacent to the furnaces. Movement of work between departments and from one operation to another is by tote boxes on casters.

Production equipment includes six conventional hydraulic die casting machines—four for aluminum, one for zinc and one for magnesium—ranging in capacity from 150 to 600 tons pressure. Aluminum casting machines can produce castings up to 200 sq in. and weighing up to 10 lb. The zinc casting machine can turn out castings up to 800 sq in. and weighing as much as 20 lb. The magnesium machine will produce castings approximating 200 sq in. and weighing 6 lb. Additional space and functional connections in the production line have been provided for two additional machines.

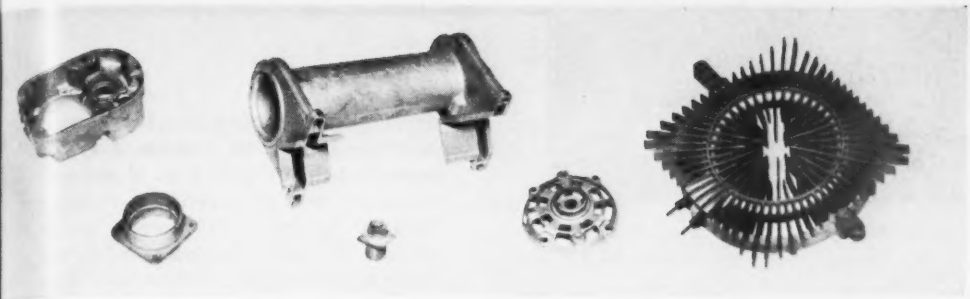
Machine cycle velocity in die casting will vary with part dimensions, complexity of design and metal alloys used. Higher production cycles are obtained on smaller parts, permitting as many die cavities as possible dimensionally within the die area. In aluminum, for instance, 30 shots per hour may be made on large castings such as transmission bell housings, and 200 shots per hour on

J. P. Kish, plant manager, T. J. Lester, president, and M. J. Auerbach, sales manager, left to right, discuss some engineering problems

Well-lighted final finish and inspection bay contains precision equipment necessary to do the mechanical operations required in assuring that each casting meets specifications



Drilling, reaming, facing, trimming, filing, tapping, threading, punching, broaching and similar operations are performed in the processing and finishing department by experienced machine operators



Die cast products of Lester Castings, at left, include aircraft fittings, motor end bells, antenna rotor housings and threaded plugs

parts such as light hardware and small fittings. Zinc casting is even more rapid, due to automatic injection by the hot chamber method; it may exceed 400 shots per hour. Thus, for example, a six-cavity die for a water faucet handle can produce over 2000 parts per hour. Magnesium die casting is approximately 15 per cent more rapid than aluminum.

Metal is melted in open type, gas-fired furnaces with cast iron pots to these maximum temperatures: Aluminum, 1300°; zinc, 875°; magnesium, 1250°. Each of the four aluminum casting machines has a 500-lb capacity furnace adjacent to it from which the operator hand dips metal for each shot. The zinc unit has a 200-lb furnace as an integral part of the machine, and a predetermined amount of zinc is automatically injected into the machine during each cycle. The magnesium machine has a 250-lb capacity furnace adjoining it from which the operator also hand dips metal for each shot. Each machine has its own 200 to 500 lb capacity secondary furnace that supplies remelt metal for later use. After remelting, the metal is poured into pigs and stored until needed.

Furnaces operate continually in a full two-shift basis with the exception of weekends. Cast iron pots have a normal life of three weeks under these conditions. Pots are removed each week, chipped and washed to extend their useful life.

Aluminum alloy ingots of the following approximate analysis are used: Si 7.5-9.5, Mn 0.50 max, Cu 3.0-4.0, Fe 2.0 max, Mg 0.10 max, Ni 0.50 max, Zn 1.0 max, Sn 0.30 max, and total others, 0.50 max. Balance is aluminum.

Zinc alloy ingots used are of this approximate analysis: Al 3.90-4.30, Cu 0.03 max, Mg 0.03-0.06. Balance consists of 99.99 plus per cent zinc.

Magnesium alloy ingots of the following approximate analysis are used: Al 8.3-9.7, Zn 0.4-1.0, Mn 0.13 max, Cu 0.10 max, Si 0.5 max, Ni 0.03 max, and total all others 0.3. Balance is magnesium.

As set up at Lester Castings Inc., each die casting machine is a two-man operation. Operator actuates the machine and visually inspects all castings as he removes them from the die. Castings are placed either on a bench near the operator or in tote box. A helper degates the good castings and removes any heavy flash, and returns gates, sprues, flash and rejects to the secondary or breakdown furnaces for remelting. Alloy loss during remelting operation is negligible. Acceptable castings are transported to the trimming and finishing department.

This preliminary inspection by the operator is to check finish, poor fill, obvious porosity, broken cores, cracks, distortion, depressed or raised ejector marks, or other possible defects. Additional visual inspection is performed as each casting proceeds through the various trim and finish processes which are required.

To prevent the possibility of mixing aluminum, zinc and magnesium scrap before remelting, extreme caution is exercised by helpers as they remove gates, sprue and flash before sending castings to succeeding operations. Material thus removed from the castings does not leave the foundry and is always within 12 to 15 ft of the furnace in which it will be remelted. Excess metal removed by trimming dies in the finishing department is also carefully cataloged for return to the proper furnaces.

Trimming and finishing department contains all the mechanical equipment essential to the rapid, economical trimming, drilling, tapping, reaming, facing, threading, filing, punching, broaching or other operations required on a wide variety of intricate castings. Before packaging for shipment, all castings are given a final inspection with special gages to insure that all required finishing operations have been completed.

Physical property testing of castings is done in the inspection department. As metal is remelted, periodic alloy test samples are taken to check analysis for conformance with standards. Castings taken periodically from production runs are laboratory tested for tensile and impact strength and pressure tightness.

All dies used at Lester Castings are engineered, designed and made in the company's complete tool and die shop. The latest milling machines, shapers, lathes, planers, grinders, drill presses and other necessary equipment are used with skill by expert craftsmen and tool and die makers who average 17 years' experience in this field. Approximately 115 to 120 separate dies are cataloged and in inventory. Test castings are run in the foundry for customer approval before dies are hardened and set up for production runs. Occasionally experimental runs are made with hastily prepared temporary dies.

While die casting itself is basically a simple process, continued production of quality castings results from years of experience in engineering, designing and experimenting to perfect sound methods and techniques. This type of experience is evidenced at Lester Castings Inc. by the high quality of its products.

Questions and Answers

Makes suggestions to overcome difficulties encountered due to penetration of cores . . . While metal molds can be used over long periods of time their lives vary considerably . . . Area of casting determines lifting pressure . . . Aluminum bronze handling requires attention . . . Melting aluminum . . . Gas troubles

Reducing Penetration of Cores

QUESTION Up until a few months ago we were encountering considerable burn-in and scabs from the following sand mix—6 cu ft lake sand, 2 cu ft bank sand, 1 cu ft natural molding sand (20 per cent clay), 8 lb corn flour, 6 qt core oil, and 1 pt kerosene. This mix gave a green permeability of 90 to 100, green compressive strength 1.9 to 2.2 psi, flow 95 to 100, and dry tensile 260 to 300 psi. A short time ago we changed the mix and eliminated the scabs and somewhat reduced the burn-in. The new mix was composed of 6 cu ft lake sand, 2 cu ft bank sand, ½-cu ft molding sand, 4 lb corn flour, 1 lb western bentonite, 7 qt core oil and 1 pt kerosene. This mix shows a green permeability of 65 to 75, green compression strength 1.2 to 1.5 psi, flow 96 to 99, and dry tensile strength 165 to 185. Screen analysis of the blended sands gives the following: On 20 mesh 0.190, 30 mesh 0.850, 40 mesh 7.690, 50 mesh 27.224, 70 mesh 27.000, 100 mesh 14.000, 140 mesh 12.966, 200 mesh 8.000, 270 mesh 1.176, pan 0.090 or a total of 99.190 and clay 0.810. Pouring temperature of castings with which cores are used averages between 2580 and 2700° F. Can you make any suggestions which will eliminate the burn-in?

ANSWER From your description of the changes made in your core mix and the improved results obtained, it appears that your trouble may have been due to low hot strength, with possibly too open or coarse a mix or a combination of both. By cutting the amount of molding sand in half and adding western bentonite you performed a double-barreled operation in that the bentonite increased the hot strength while the reduction in the amount of sand to a degree helped close up the mix. That the sand has been closed up to an appreciable degree is indicated in the reduction of the permeability from an average of 95 to 70.

With the beneficial results obtained through decrease in the amount of molding sand and addition of bentonite, we suggest that you try eliminating the molding sand altogether and add another pound of bentonite. However, we believe that the change first should be tried out on a small scale to observe results obtained. For example, you could try the following mix—100 lb lake sand, 43 lb bank sand, 10 oz corn flour, 6 oz bentonite, 1¼ qt core oil and 2.5 oz kerosene.

Silica flour will increase hot strength and possibly you may want to determine its effect. Since it increases hot strength considerably in combination with bentonite or clay, it is advisable to start with 1 per cent by weight, using small test batches, and increase the amount rather than the other way around.

Life of Metal Mold Will Vary

QUESTION We will appreciate any information on the life expectancy of permanent molds for casting of aluminum alloys. Also we would like that to include data on repair and maintenance problems.

ANSWER Mold life, according to available information, varies considerably. It depends largely upon design of the gating system and point of impingement of the metal stream on the casting cavity. Molds for simple castings will have a longer life than those for intricate castings.

Some years ago Vickers stated that nothing should be left to chance on mold use in the foundry. Before the mold is placed in service standard procedures must be developed on the type of mold coating to be used and its application, on the pouring temperature of the metal, temperature of the mold, method of pouring, and production time cycle. Neglect of any of those items will lead to decrease in mold life and in some cases to premature failure.

Whether or not a mold can be repaired to extend its life will rest largely on the location of the defective area, its extent and nature. Where metal impingement has eroded or roughened the surface to a slight degree, the faulty section may be smoothed up by grinding. If a small crack or two is involved, it may be possible to gouge them out sufficiently to apply suitable weld rod filler and machine to the proper contour. In other cases the defective area may be tooled out and an insert of the same material as the mold put in place.

Maintenance will depend primarily on mold complexity. In some cases the mold may be two pieces hinged together to open and close like a book, while in other cases the mold may be composed of a number of parts which move on slides and are operated by racks and pinions, etc. Essential feature of maintenance is to set up regular inspection schedules which will vary with the complexity of the mold. In that way proper lubrication is insured and slight adjustments to operating mechanisms can be made to prevent breakdowns.

Figuring Weights for Molds

QUESTION We pour flat bronze castings such as nameplates, grave markers, plaques, etc., and want to try use of cast iron weights for holding down the copes instead of clamping as presently practiced. Can you tell us how to figure the required weight which when placed on the cope will give a good fit all around the parting line and stop run-outs and heaves?

ANSWER Lifting pressure of metal against the cope is equal to the area of the casting in the horizontal plane multiplied by the height of the sprue above the joint line times the weight of a cubic inch of the metal or alloy being used. If the cope flask is fairly large and contains considerable sand, the combined weight can be determined and subtracted from the previously calculated figure to obtain the weight required to prevent the cope from lifting.

For example, assume that a flat bronze casting 6 x 8 x ½-in. is to be made in a 10 x 12 x 3-in. flask. The lift or head created by the metal will be 6 x 8 x 3 x 0.3 or 43.2 lb (the value 0.3 is the weight of a cubic inch of bronze). Now assume that the size of the mold weight is to be 10 x 10 in. Cast iron weighs about 0.26 lb per cu in., and 43.2 lb will occupy a volume of approximately 167 cu in. Hence a plate 10 x 10 x 1.67 in. will serve as the mold weight.

If you want to include the flask

and sand as part of the weight, subtract their weight from the value for the metal head, and use that figure to determine the mold weight. Cubic content of the flask will be 10 x 12 x 3 in. or 360 cu in. The 6 x 8 x ½-in. casting will have a volume of 24 cu in., leaving 336 cu in. of sand. Figuring sand as weighing 100 lb per cu ft, the weight in the flask would be 19.6 lb. Assuming that the flask is made of $\frac{3}{16}$-in. steel, it would weigh about 3.3 lb. Hence, the sand and flask would weigh 22.9 lb. Subtracting that from the 43.2 lb metal head leaves 20.3 lb to be supplied as the mold weight. Using the 10 x 10 in. size, it would have to be only about 0.8-in. thick to provide the desired weight.

Handling of Aluminum Bronze

QUESTION We are planning to make some aluminum bronze castings, and will appreciate some information on melting and pouring.

ANSWER Since aluminum bronze is a copper-base alloy it should be melted under slightly oxidizing conditions to minimize pickup of gases. Opinions differ on use of a cover during melting; you can try melting with and without such a cover or flux, of which several proprietary types are available. Aluminum bronze should not be stirred any more than necessary and not violently under any condition because that tends to carry the aluminum oxide skin into the metal. Excess stirring also increases oxidation of aluminum.

Pouring temperatures will vary from about 2030° to 2230° F depending on section thickness of the casting—the higher temperature being used for light section. Best temperature is determined by experiment and usually is the lowest at which the alloy will fill the cavity and produce a sound casting. Lip of the crucible in pouring should be as close to the sprue opening as possible to expose as little of the stream to oxidation, also to prevent inspiration of air. Pouring should be steady to eliminate rupture of the oxide envelope surrounding the metal stream. Rupture or disturbance of the envelope or skin usually results in aluminum oxide inclusions in the casting.

Gating system for the castings should be arranged to permit entry of the metal without turbulence or agitation. Usual method is to have the gate at the lowest point of the casting and away from any abrupt turns, projecting cores, etc., which might break the oxide skin. Short freezing range of aluminum bronze requires liberal risers. At heavy sections where it is difficult to attach risers, chills should be used to promote directional solidification.

Melting of Aluminum Alloys

QUESTION We will appreciate information on furnaces for melting small quantities of aluminum alloys, and in particular would like to know the relative merits of iron and nonmetallic pots in cases where the alloy should be relatively free from contamination.

ANSWER Furnaces for melting aluminum alloys in a wide range of capacities are available from a number of manufacturers whose names and addresses may be found in the advertising pages. Furnaces are designed to provide minimum gas absorption and oxidation, and if you

Aluminum melting furnaces

supply the manufacturers with information on the desired melting capacity and type of fuel to be used they will be glad to give you details.

Both iron and nonmetallic pots or crucibles are used in melting aluminum alloys, but where the iron content must be kept at a minimum —such as in the case of aluminum-silicon and aluminum-magnesium alloys—graphite or silicon carbon pots should be employed. While cast iron pots are said to have a better transfer of heat to the metal, careful attention must be given to coating the interior to minimize iron pickup. They must be cleaned thoroughly by scraping to remove any loose scale. Then they should be coated with whiting or other suitable refractory, using about 4 lb per gallon with or without ½-pint of sodium silicate, with the pot temperature of 200 to 400° F. Pot also should be inspected during operation to catch any localized wash or coating failures.

Has Trouble in Copper Alloys

QUESTION We have been having trouble with our copper-base alloy castings, especially with small rings of ½-in. square section. The centers have dark areas and break under pressure. We also have trouble at times with castings being full of fine check marks or shrinkages. We suspect sulphur as the cause. Gas used as fuel comes from Texas, and there have been a number of complaints about the gas containing sulphur. We had a section of a casting made by another foundry analyzed and it showed 0.02 per cent S. We have taken up the matter with the gas company without success. One foundry having trouble installed a filter using activated carbon and eliminated the trouble. We cannot put in a filter as we have low-pressure gas, and it would be expensive to install a high-pressure line. Are there any fluxes which will remove sulphur, and what percentage of sulphur can be in the metal without injuring it? We do not believe it is the metal because we have tried different compositions with the same results.

ANSWER According to published information, sulphur content up to 0.08 per cent should not affect the properties of copper-base alloys. In general, the consensus is that unless highly sulphurized fuels are used or sulphur-bearing materials get into the metal charge, little difficulty is encountered from sulphur. Possibly your trouble may be due to sulphur since, like hydrogen, it will combine with oxygen to form a gas which is ejected on solidification to form pinholes. However, we suspect that the essential trouble is due to general gas absorption of hydrogen and water vapor as well as sulphur. Careful attention to melting conditions will eliminate the difficulty.

Essential point is to melt under slightly oxidizing conditions in the furnace atmosphere. Bring the alloy up to temperature as rapidly as possible but do not let it stand in the furnace for any length of time. Permitting the alloy to remain in the furnace at elevated temperature allows increased absorption of furnace gases. Just before the pot or crucible is pulled from the furnace add the recommended amount of any of the several degasifying materials such as lithium, boron, etc. Then pour a plug 1½ in. in diam and 3 in.

long or, preferably, the suggested fracture bar ¾ x 3 x 6-in. with one of the ¾ x 6 in. faces against a chill. In case of the plug the top is observed to see that it pipes or shrinks properly. The fracture bar is broken and the structure examined for evidence of gas porosity. If the plug does not shrink or the bar shows gassiness, more degasifier is added and another test made.

As to installation of a filter, we cannot see why it will not operate with low-pressure gas unless the filter material is in a finely divided state. In that case we believe a large bed area, using screens to hold thin layers of the filter material, would function. Again you might install a booster pump just ahead of the filter.

As a final thought we suggest you examine the gating systems for the castings giving the most trouble and see whether a change will help. Also it will be well to survey your pouring temperatures. Possibly so many molds are being poured from one pot that the first are too hot and the last too cold.

Recover Metal From Turnings

QUESTION We operate a machine shop in connection with our foundry and have accumulated more aluminum chips and turnings than we can dispose of as part of the crucible charges in the foundry. Can you suggest how we can melt them down and recover the metal?

ANSWER For highest recovery of metallics from chips, borings and turnings of aluminum, they should be melted in large hearth or reverberatory type furnaces where they can be covered by heavy scrap and fluxes, or in double-chamber hearth furnaces where a wall with a subterranean connection separates the two. Actual melting takes place in one chamber while the molten metal flows into the other containing the borings, etc. through the passage and dissolves them. In both procedures the fine material is protected from the oxidizing action of the furnace gases, and suitable fluxes are employed to obtain better separation of metal from the oxides and drosses.

Presumably you are not interested in a large scale recovery operation which would be necessary to amortize the previously mentioned furnace equipment, but rather in recovery by use of a crucible. This procedure is slow and tedious, and usually the recovery of metal is not too high. Steps in crucible recovery are to first form a sizable heel of molten metal in the bottom of the crucible from heavy scrap. When that is good and hot a small quantity of the turnings is added and pushed beneath the surface until dissolved. Additions are continued until the bath shows signs of becoming cold. Then the metal is allowed to regain heat, and more additions made. The process is continued until the crucible is full of metal. The metal is poured into pigs or ingots which then are analyzed for composition.

Cross Indexes Specifications

QUESTION Do you have any information on a chart or book on specifications for ferrous alloys? We do repair welding for a large firm and while our blueprints used to come through with either a chemical analysis or an SAE number, they now come through with only an ASTM number or some other specification.

ANSWER While the Gray Iron Founders' Society and the Steel Founders' Society of America have published charts giving information on compositions, properties and specifications, they relate only to castings. These would cover only a small part of your welding operations since presumably you also deal with a considerable quantity of wrought materials.

We believe that the best source of information for your work is the book *Supply Logistics Handbook, Standardization H 1A, Cross Index of Chemical Equivalent Specification and Identification Code* (Ferrous and Nonferrous Alloys) available for $1.75 from the U. S. Government Printing Office, Washington 25, or our book department.

Small Coke Cause of Trouble

QUESTION We are having trouble with our cupola which only appeared when, through necessity, we had to change from a 3½ x 5-in. coke to 2½ x 3½-in. size. No changes have been made in bed height or air supply which comes from a fan-type blower. We tap 1000 lb at 8 to 10-minute intervals. Iron formerly showed over the spout in 8 to 9 minutes, but now takes 10 to 14. Trouble starts before iron shows at the taphole, as a sticky slag tends to freeze in the hole and at first and second taps it can be opened only enough to permit about one-fourth the volume that should come through. Subsequent taps increase in volume, but not enough to permit emptying the well before another charge is ready to be tapped.

ANSWER Your trouble is a good example of an effect which is not readily associated with the cause—insufficient air which results in cold iron and cold slag. A fan-type blower delivers air in direct relationship to the resistance on the delivery or discharge side. If the back pressure is low, the delivery is high; the converse results when the back pressure is high. In your case the small coke has increased the back pressure thereby reducing the air volume. As a result the combustion temperature has decreased and the iron and slag are cold. Reduction in melting rate and the sticky slag reflect that condition.

The trouble can be corrected by obtaining a blower which will deliver the required volume of air under sufficient pressure at all times, screening the coke with a fork with the tines 2½ in. apart, and using larger or bulkier scrap to open up the charge. Iron flow might be obtained by enlarging the taphole and increasing slag fluidity by addition of fluorspar or soda ash, but that will not correct the fundamental difficulty.

Adding Sodium to Aluminum

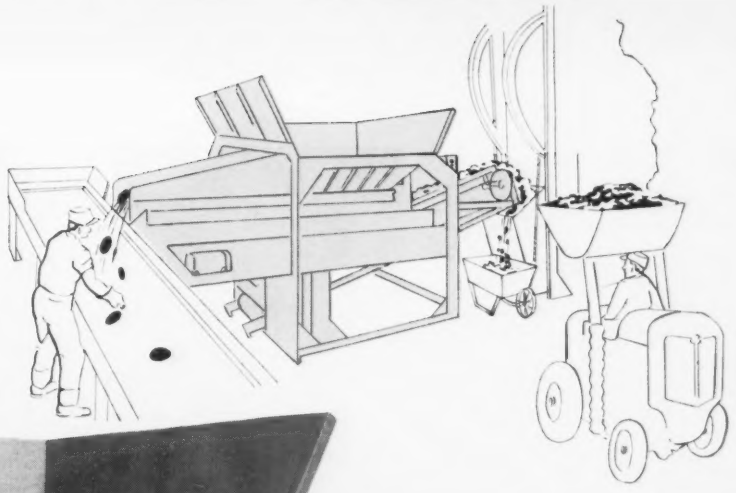
QUESTION We have some difficulty in a mottled appearance with the 5 per cent silicon-aluminum alloy, and recall that it can be overcome by addition of a small amount of sodium. We use an induction furnace and have difficulty in getting enough sodium into the alloy to obtain the desired results. Can you suggest a satisfactory procedure?

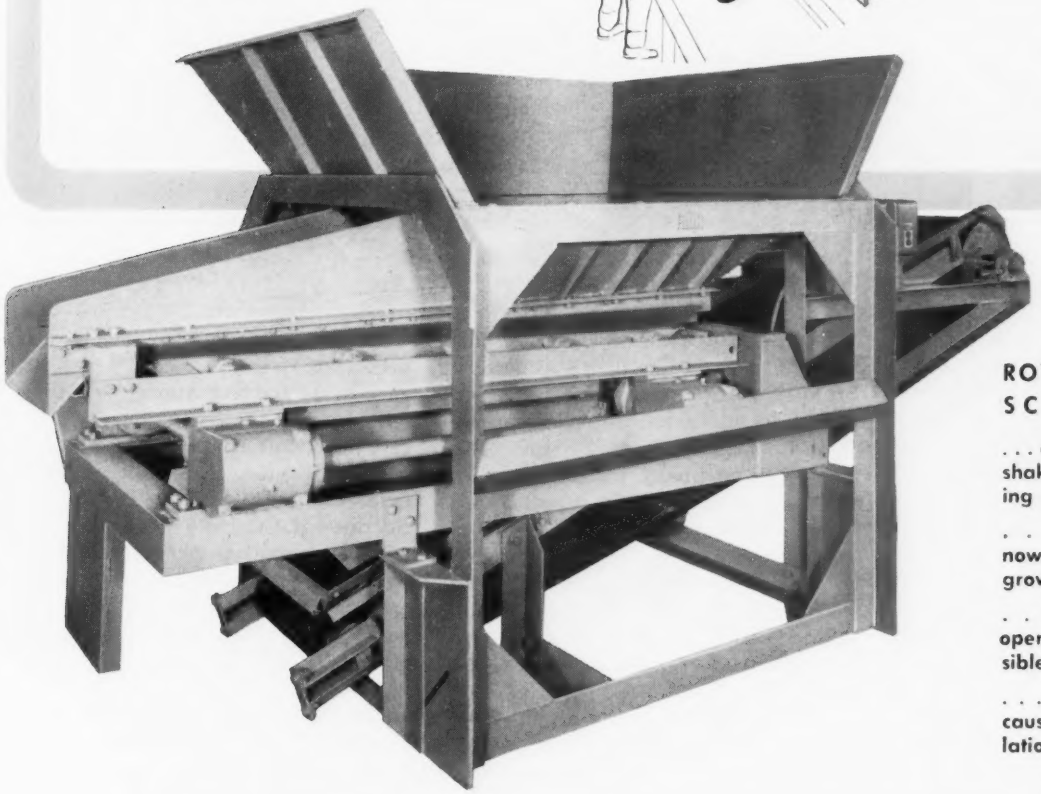
ANSWER Metallic sodium can be added in two ways. The choice of method will depend upon the quantity of metal to be modified and the specific operating practice. One way is to place the required amount of sodium in the bottom of a preheated crucible and pour the molten aluminum over it so that proper mixing occurs. Some skill and experience are necessary with that practice since sodium is light and tends to float rather than dissolve.

The other method is to wrap the metallic sodium in aluminum foil, place it in a graphite phosphorizing cup and plunge it to the bottom of the crucible where it is held until solution is complete. This will take from 3 to 5 minutes. After reaction is completed, the metal should not be held too long since the effect of the sodium addition will disappear.

In your case the sodium addition should be made outside the furnace because the "pinch effect" or rolling action of the bath tends to cause a more rapid loss of sodium. Metallic sodium weighs about 0.53 oz per cu in., and 1 in. of the usual ⅝-in.-diam stick will weigh 0.2 oz. As only a small amount of sodium is recovered by the metal, the usual addition ranges from 0.01 to 0.5 per cent. Hence, the addition of 1 to 2½ in. of a ⅝-in.-diam stick of sodium should serve.

One Simple **MECHANIZED** Operation





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. . . gives mechanization now, yet allows for future growth

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Front end loaders scoop up sand and castings from the molding floor and deposit them into the ample hopper of the Royer. The rapid, positive walking-beam action of the shake-out breaks up the sand and conveys the castings and large scrap off the end to sorting table or conveyor. Magnetically cleaned sand is discharged at the opposite end to muller skip hoist, conveyor belt to a sand handling system or into a Royer Sand Separator & Blender for complete sand conditioning. Entire unit is above floor level, eliminating costly pits and excavations . . . high casting and sand discharges allow related equipment to also be located above floor level.

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MEN . . . of Industry

HARRY M. ST. JOHN
. . . retires, Crane Co.

JOHN S. HUTCHINS
. . . Brake Shoe division pres.

RICHARD R. DEAS JR.
. . . Hamilton Foundry v. p.

HERBERT S. HERSEY
. . . Grindle Corp. pres.

HARRY M. ST. JOHN has retired as superintendent of nonferrous foundries, Crane Co., Chicago, after 17 years with the company. He plans to establish permanent residence in Fort Pierce, Fla., and continue his foundry interests as a consultant. A graduate of Cornell University, Mr. St. John was previously associated with Commonwealth Edison Co., Chicago, and Detroit Electric Furnace Co. and Detroit Lubricator Co., Detroit. He is a past chairman of the Brass and Bronze Division of the American Foundrymen's Society and in 1947 was awarded the society's William H. McFadden Gold Medal for outstanding work in the field of nonferrous casting research. He is also a past chairman of the Detroit and Chicago sections of the American Institute of Mining and Metallurgical Engineers.

J. A. Arter was appointed vice president - manufacturing, **J. P. Henry,** general sales manager, and **R. J. Severson,** assistant general sales manager, Ampco Metal Inc., Milwaukee. Mr. Arter joined the company in 1937. Mr. Henry, with Ampco 18 years, has succeeded **S. C. Lawson,** resigned. Mr. Severson became associated with the company in 1943.

Harlan W. Cobb has been appointed field engineer in the New England-New York state territory, Norton Co., Worcester, Mass. **Alfred C. Womer,** formerly field engineer in the Cleveland district office, has replaced Mr. Cobb as abrasive engineer in the northern Ohio area.

John S. Hutchins, president of the Ramapo Ajax Division, American Brake Shoe Co., New York, has been named to additional duties as president, National Bearing Division. He joined the company in 1925 and is a vice president of the parent company. **Thomas W. Pettus,** also a company vice president, and formerly president, National Bearing Division, has been assigned to over-all railroad sales. **Charles M. Ruprecht** has been named executive vice president, National Bearing Division. He joined the company in 1946 and since 1953 was president of Electro-Alloys Division. **Paul L. McCulloch Jr.** becomes president of Electro-Alloys Division. With American Brake Shoe since 1945, he was sales manager of Electro-Alloys Division since 1953.

Richard R. Deas Jr., since 1951 works manager, Hamilton Foundry & Machine Co., Hamilton, O., has been made a vice president of the company. He was formerly associated with American Cast Iron Pipe Co., Birmingham, as works manager and a director, and as senior engineer, Lester B. Knight & Associates, Chicago. Prior to joining Hamilton Foundry he was research director of Hamilton Research & Engineering Corp., Anniston, Ala. Mr. Deas is a former chairman of the Birmingham Chapter of the AFS.

Harry C. Moore, president, Beloit Iron Works, Beloit, Wis., was named a director of Cutler-Hammer Inc., Milwaukee. Mr. Moore is also a director of Sandusky Foundry & Machine Co., Sandusky, O.

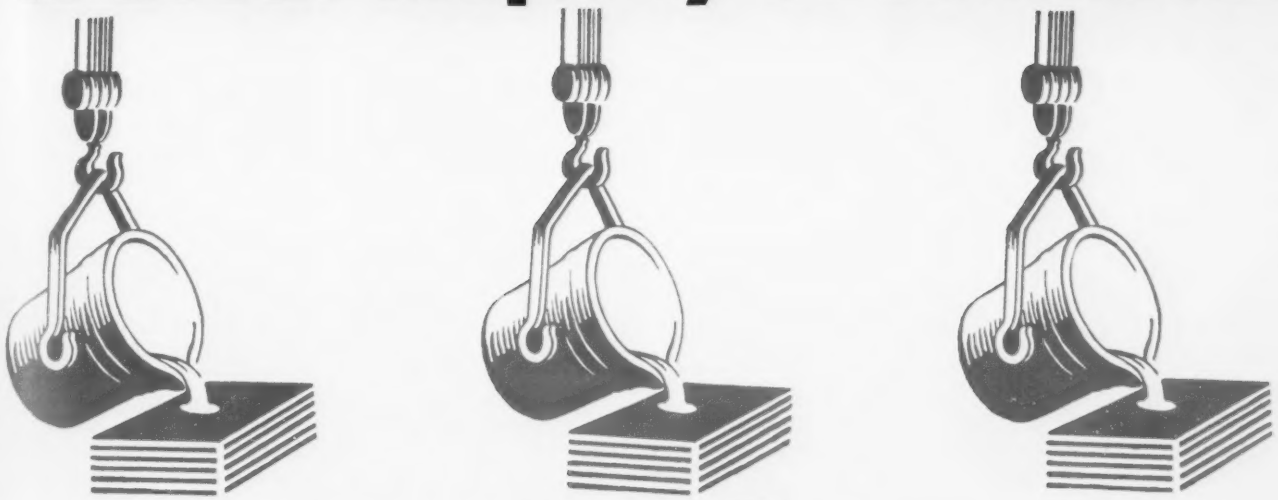
Herbert S. Hersey was elected president, Grindle Corp., Harvey, Ill., succeeding the late Aubrey J. Grindle, who founded the company. Mr. Hersey, who will continue as president of C. O. Bartlett & Snow Co., Cleveland, will be assisted by present officers of the Grindle Corp. and **C. J. Neville,** executive vice president and treasurer of Bartlett & Snow, who will act as an associate. Mr. Hersey became Canadian representative of the Bartlett & Snow organization in 1912, and went to Cleveland 3 years later. He was president of Foundry Equipment Manufacturers' Association in 1938-39 and president of the Conveyor Equipment Manufacturers' Association in 1945.

Harold C. Medley was recently appointed chief engineer of the Conveyor Division, Jeffrey Mfg. Co., Columbus, O. **Arnie J. Kindig** has succeeded Mr. Medley as manager of the conveying research and development section. Mr. Kindig was formerly in charge of chain and belt idler research for the company.

Harold V. Engh was recently elected president, Turner Brass Works, Sycamore, Ill., succeeding **John Slezak,** resigned. For the past 8 years Mr. Engh was president, Pyle-National Co., Chicago. Previously he was executive vice president, Anaconda Wire & Cable Co., New York.

Richard A. Schaus has been named manager of induction and equipment engineering, Industrial Heating Dept., General Electric Co., Schenec-

A Great Majority of Foundries



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Write for Bulletin 46-A

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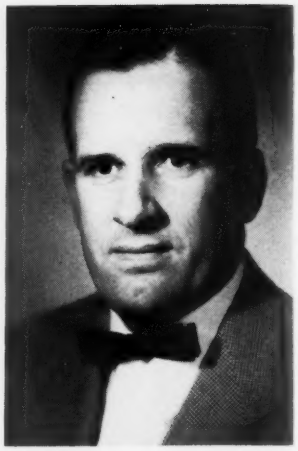
. . . Urick Foundry v. p.

JAMES O. SMITH
. . . foundry supt.

HOWARD F. FREED
. . . sales-service, Urick



HAROLD C. TALLING
. . . sales mgr., Urick Foundry

tady, N. Y. A graduate of University of Michigan, he was recently engaged in reactor development at the company's Atomic Power Laboratory in Schenectady.

J. Douglas James recently was elected vice president and general manager, Urick Foundry Co., Erie, Pa. His previous connections include Latrobe Steel Co., Latrobe, Pa., Erie City Iron Works, Erie, Pa., and Cooper-Bessemer Corp., Grove City, Pa. One of the founders of the Northwestern Pennsylvania Chapter of the AFS, he was its chairman in 1951-52. **Harold C. Talling** is sales manager for the company. He was formerly associated with Erie Bolt & Nut Co. and General Electric Co.'s foundry department, both of Erie. **James O. Smith,** foundry superintendent, during the past 20 years was employed by Koppers Co., Baltimore, Cooper-Bessemer Corp., Grove City, Pa., and Enterprise Ductile Iron Works, Los Angeles. **Howard F. Freed,** sales-service engineer for Urick Foundry, during the past 20 years was associated with Jones & Laughlin Steel Corp., Pittsburgh, and Butler Engine & Foundry Co., Butler, Pa. **Harold C. Boden** has assumed new duties as production manager. Prior to joining the company in 1929 he was connected with Interlake Iron Corp., Erie, Pa.

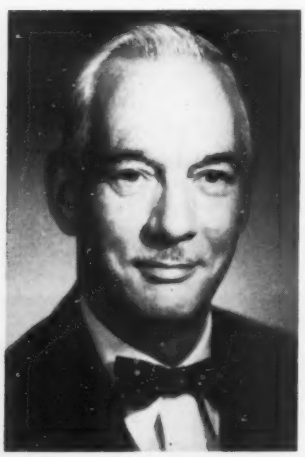
Carl Mayer Jr., for 4 years vice president-general manager, Carl Mayer Corp., Cleveland, has succeeded his father, the late Carl F. Mayer, as president of the company. He has been associated with the industrial oven design firm for the past 10 years.

Dr. Augustus B. Kinzel was elected vice president-research, Union Carbide & Carbon Corp., New York, succeeding **Dr. George O. Curme Jr.** Dr. Curme has retired as vice president and will continue as a director. Dr. Kinzel joined Electro Metallurgical Co. in 1926, became chief metallurgist of the laboratories in 1931 and vice president of that division in 1944. He was appointed director of research for the parent company last year.

C. I. Young was named vice president - general manager, Laclede-Christy Division, H. K. Porter Co., St. Louis. Until recently he was vice president in charge of operations at all Laclede-Christy plants. Previously he was associated with Harbison-Walker Refractories Co. and Union Fire Brick Co., both of Pittsburgh.

Herbert H. Clarke Jr. was appointed executive vice president, Chemical Division, Borden Co., New York. Mr. Clarke joined the division in 1940 and became sales manager of the western area in 1946. In 1951 he was named vice president in charge of West coast operations and went to New York last year as vice president-sales manager.

Norman L. Deuble was named manager of the metallurgical development division recently established by Climax Molybdenum Co., New York, for adaptation of molybdenum alloy steels and application of molybdenum as an alloying material. A graduate of Case Institute of Technology, Mr.



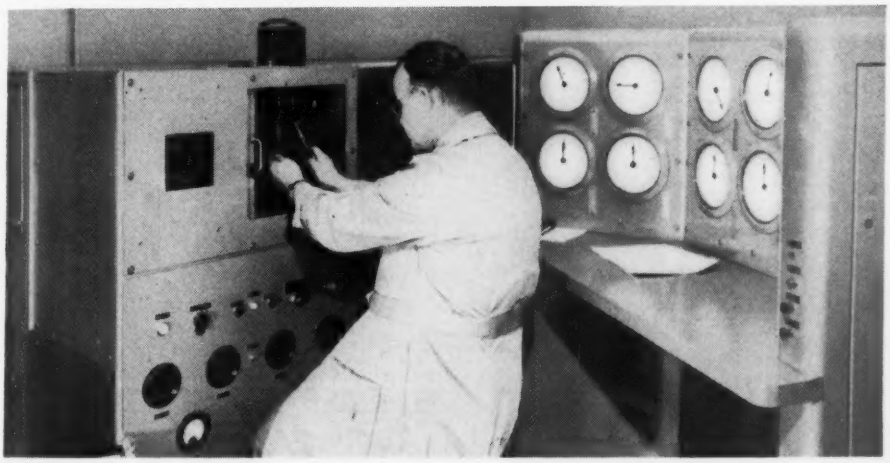
HAROLD C. BODEN
. . . production mgr.

DR. AUGUSTUS B. KINZEL
. . . Union Carbide v. p.

C. I. YOUNG
. . . Laclede-Christy v. p.

NORMAN L. DEUBLE
. . . manages new division

THE BAIRD DIRECT READER AT FORD MOTOR COMPANY



Fast, accurate control of metal composition, a critical factor in the efficient operation of the Cleveland Foundry of the Ford Motor Company is accomplished with the Baird Associates Direct Reader. Approximately 165 samples are run during two 8-hour shifts to control the quality of 2,000 tons of grey iron poured daily. The total time for simultaneous analysis of elements present is less than 40 seconds.

In a quality control system with a heavy work load of a variety of metals, the new 1955 Direct Reader operates efficiently and economically. For more information on how the Direct Reader can reduce costs and increase production, write for Bulletin C.

Supplementing the Direct Reader, is the Spectromet, an automatic 6-element instrument operable on the production floor. Write for Bulletin 42.

Baird Associates, Inc.

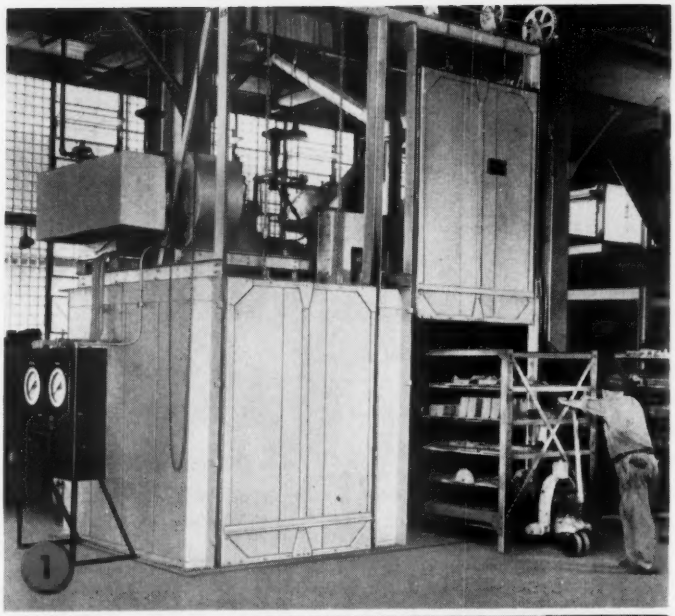
33 UNIVERSITY ROAD, CAMBRIDGE, MASS.

NEED MORE OVEN EFFICIENCY?

carl mayer CAN DO IT

That's right, for any baking requirement there's a Carl Mayer oven that will do the job faster and cheaper, to give you the efficiency so necessary in today's competitive markets.

The exclusive heat recirculation and slotted panel construction features cut fuel costs and heating times by as much as 50%. Uniform temperatures, assured by heat recirculation, guarantee perfect baking conditions throughout the entire oven.

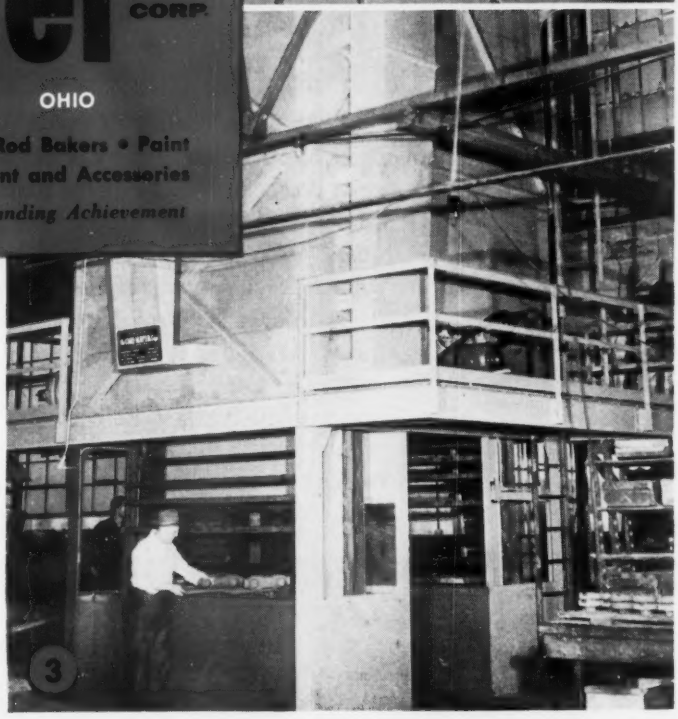


THE carl mayer CORP.

3030 EUCLID AVENUE CLEVELAND 15, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories

Recipient of the "Trinks" Industrial Heating Award for Outstanding Achievement



Hundreds of modern foundries of all sizes have found the efficiency and economy of Carl Mayer ovens pay off. Find out for yourself. Our engineers will be happy to consult with you on your particular problem.

1. This rack type oven, with heat recirculation, holds temperatures within ±5° throughout the oven.
2. Patented downdraft heating method on this car type oven increases efficiency up to 50%.
3. This vertical oven features the patented internal heat fan — increases efficiency, lowers maintenance cost.

Write for bulletin 53-CM.

ARTHUR J. BUCKLEY
. . . sales mgr., Pangborn Corp.

ROBERT S. STEVENSON
. . . Allis-Chalmers pres.

C. A. BRASHARES
. . . Harbison-Walker v. p.

A. BRENT WILSON
. . . v. p., Harbison-Walker

Deuble was formerly with M. W. Kellogg Co., New York, Copperweld Steel Co., Pittsburgh, and Repubic Steel Corp., Cleveland.

Arthur J. Buckley was recently appointed sales manager, Pangborn Corp., Hagerstown, Md. Prior to joining the company in 1952 as assistant sales manager, he was associated with Harnischfeger Corp., Milwaukee.

Adrian H. Siereveld was appointed director of employee relations, Hamilton Foundry & Machine Co., Hamilton, O. **Eldon M. Altman** continues as personnel and safety director, and **Clarence W. Rowsey** remains employment manager. Mr. Siereveld was graduated from Salmon P. Chase Law School and prior to joining Hamilton Foundry early this year was associated with Trailmobile Inc., Cincinnati.

L. C. Hewitt has been named director of research, Ironton Fire Brick Co., Ironton, O. A graduate of the ceramic engineering department, Iowa State College, Mr. Hewitt has had wide experience in the development, manufacture and application of refractories. He was formerly with Laclede-Christy Co., St. Louis.

Robert S. Stevenson, since 1952 executive vice president, Allis-Chalmers Mfg. Co., Milwaukee, was elected president, succeeding the late William A. Roberts. Mr. Stevenson attended Whitworth College and was graduated from Washington State College. He joined the company's tractor division at the Kansas City, Mo., branch in 1933, and during the next 18 years was associated with this division as manager of the Northwest and Southwest territories, general sales manager and vice president. He became a director of the company in 1951.

C. A. Brashares was elected vice president-sales, **A. Brent Wilson** vice president-subsidiaries, and **W. C. Robinson Jr.** a director, Harbison-Walker Refractories Co., Pittsburgh. Mr. Brashares joined the company's research department in 1928, after graduation from Case Institute of Technology. For the past year he was general sales manager of the company. Mr. Wilson, a graduate of Queens University, Kingston, Ont., joined Canadian Refractories Ltd., a company subsidiary, in 1934 and later became its general manager. Since 1950 he was assistant to the president. Mr. Robinson is president of National Electric Products Corp., Pittsburgh.

William R. Divine was appointed vice president and manager of the Washington office, Lester B. Knight & Associates, Chicago. **Howard W. Maxon** was named vice president in charge of plant engineering, and **Lincoln J. Karmen** was appointed manager of the New York office.

Charles E. Coulter has been appointed assistant sales manager, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland. Mr. Coulter was graduated from University of Southern California. Since 1946 he was sales representative for the division in Chicago and Rock Island, Ill. **Louis Lund,** for the past

ADRIAN H. SIEREVELD
. . . employee relations head

L. C. HEWITT
. . . becomes research director

CHARLES E. COULTER
. . . assistant sales mgr.

LOUIS LUND
. . . ADM sales, Rock Island

MEN OF INDUSTRY

JOHN A. WETTERGREEN
. . . Bucyrus-Erie v. p.

LAWRENCE F. BOLAND
. . . Beryllium Corp. vice pres.

HARRY C. PLATT
. . . heads Brake Shoe Division

VICTOR M. ROWELL
. . . Dietert Co. executive

two years in the Cleveland sales office, has been appointed sales representative in the Rock Island office for the division. A graduate of University of Minnesota, he joined the company in 1950 and for several years worked on the staff in the Minneapolis Research Laboratory.

John A. Wettergreen has been elected vice president-manufacturing, Bucyrus-Erie Co., South Milwaukee, Wis. He joined the company after graduation from University of New Hampshire in 1930 and became superintendent of foundries at the South Milwaukee plant, later serving as manager at the other plants. Last year he was named general works manager to direct plant activities in South Milwaukee, Erie, Pa., Evansville, Ind., and Chicago. From 1942 to 1948 he was associated with General Electric Co., Schenectady, N. Y., as superintendent of foundries.

J. A. Hammond was appointed general field manager, electrode product sales, with headquarters in Pittsburgh, for National Carbon Co., Division of Union Carbide & Carbon Corp., New York. He was formerly eastern regional manager. Other appointments in electrode product sales include: **J. M. Schreiner,** Pacific division manager, San Francisco; **J. S. Copley,** eastern division manager, Pittsburgh; and **James King Jr.,** central division manager, Chicago. Mr. Schreiner was sales representative in western Pennsylvania the past 3 years. Mr. Copley formerly handled industrial carbon sales in St. Louis, Philadelphia and Cleveland. Mr. King spent 3 years in plant operation and recently was engaged in electrode sales.

Cecil E. Gordon has been appointed sales engineer in the Southwestern territory, Engelberg Huller Co., Syracuse, N. Y. Other territorial assignments include: **Charles Vergan,** central; **Glenn D. Swander,** southeastern; **J. D. Kraeger,** west coast; **Earl Whitt,** mid-Atlantic; **Howard Miller,** East central; **Charles Murphy,** northeastern; **David Turner,** West central; and **Harvey Ramsay,** Canadian.

Lawrence F. Boland, since 1952 sales manager of the Beryllium Corp., Reading, Pa., has been named vice president-sales. Mr. Boland was graduated from Catholic University, and since joining the company in 1935 served as sales correspondent, production control chief and production manager.

Harry C. Platt, until recently vice president of the Engineered Castings Division, American Brake Shoe Co., Rochester, N. Y., has been appointed president of the division, succeeding **N. G. Belury,** who recently became sales vice president for the company. Mr. Platt was graduated from Massachusetts Institute of Technology and joined the company in 1941.

Victor M. Rowell, formerly technical representative, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland, has joined Harry W. Dietert Co., Detroit, as executive vice president. Mr. Rowell spent over 9 years in the foundry of Buick Motor Division, GMC, Flint, Mich., and later was associated with Velsicol

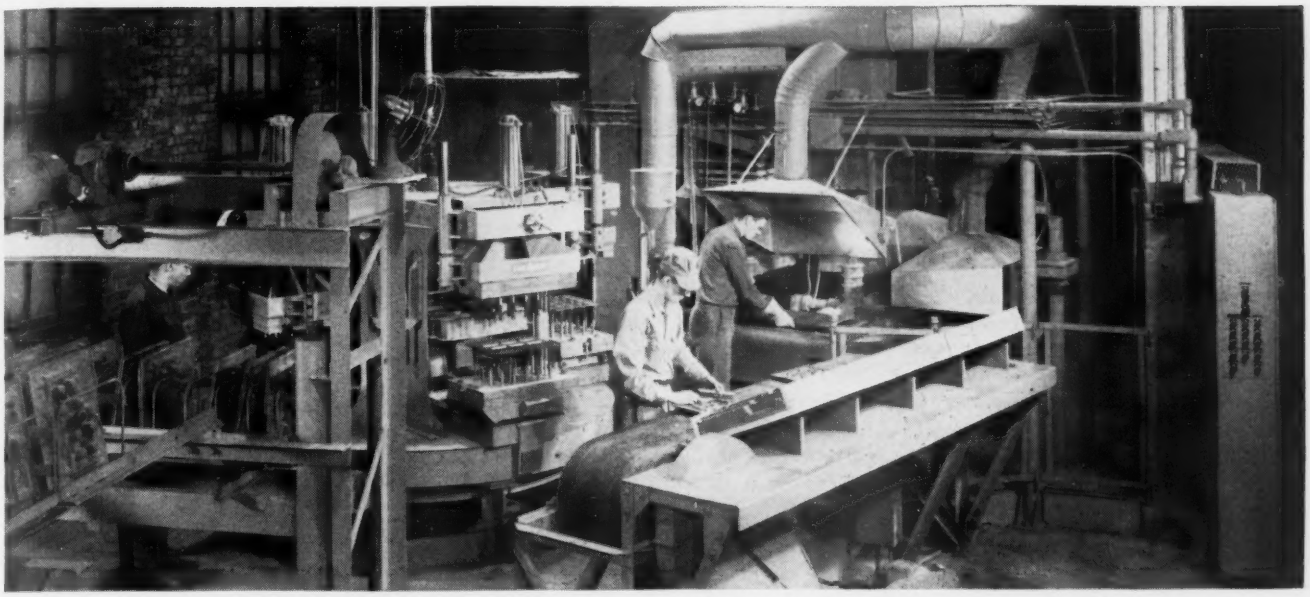
J. S. COPLEY
. . . Eastern division mgr.

J. M. SCHREINER
. . . Pacific division mgr.

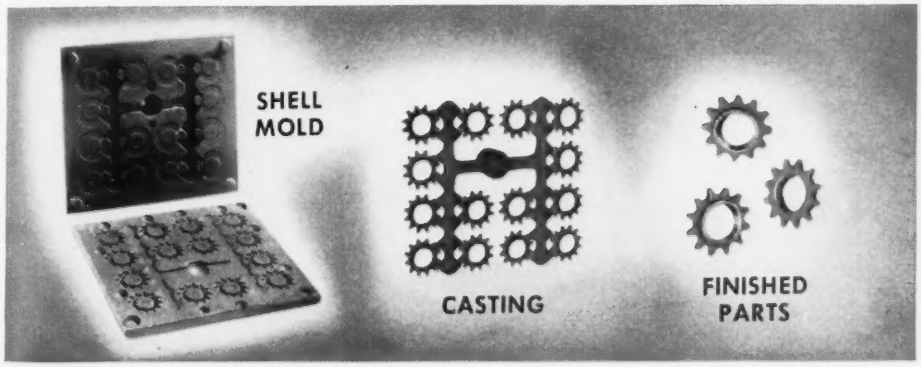
JAMES KING JR.
. . . Central division mgr.

J. A. HAMMOND
. . . National Carbon field mgr.

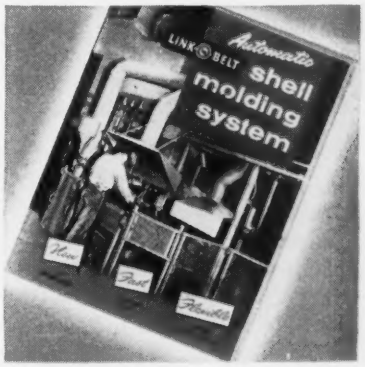
Link-Belt ANNOUNCES new automatic shell molding system



THE LINK-BELT SHELL MOLDING SYSTEM has been proved in service, and can be operated by relatively unskilled labor. Thin molds of resin-bonded sand are made at the molding machine (right background). Cores are inserted in the drag on the belt conveyor (foreground). Cope and drag are joined in the closing machine (center). Finished molds ready for pouring are removed from closing machine and placed in storage conveyor (left foreground).



THIS IS SHELL MOLDING. Clean, smoothly-joined shell molds reduce finishing costs, assure high-volume output of sound, top-quality castings—even those of intricate, thin-sectioned design.



NEW BOOK 2462 on the Link-Belt advanced automatic shell molding system contains facts of importance for every foundry.

Achieves high volume production of precision castings requiring little or no machining

Now Link-Belt brings the foundry industry a new automatic system that utilizes fully the advantages of the much-acclaimed shell molding method. To its many basic benefits, Link-Belt Shell Molding and Closing Machines contribute important advancements which assure quality molds.

In speed, compactness and automatic control, this system is particularly outstanding. Continuous tests have proved its efficiency under full-scale production conditions. Important, too, Link-Belt offers you a single source for a complete, integrated system. This includes molding and closing machines, molding, pouring, cooling, shakeout and sorting conveyors.

Can shell molding be profitable for you? It's worth your time to get the facts from your nearest Link-Belt office. Ask for a copy of Book 2462, containing full explanatory and specification data.

LINK-BELT

SHELL MOLDING SYSTEM

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13.840

W. P. PERKINSON
. . . ACCO *sales, Philadelphia*

H. O. EHRISMAN
. . . *general sales mgr.*

C. E. SULLIVAN
. . . *Foxboro consultant*

C. C. FULLER
. . . *Foxboro Co. v. p.*

Corp., and Kordell Industries, Chicago. He is active in national committee work of the Sand Division, American Foundrymen's Society.

W. P. Perkinson has been appointed Philadelphia district sales manager, American Chain Division, American Chain & Cable Co., Bridgeport, Conn. A graduate of University of Tennessee, since 1947 Mr. Perkinson was Middle Atlantic sales representative for Maryland Bolt & Nut Co., Baltimore, associate of American Chain and Cable Co.

George J. Barker, professor of metallurgical engineering, University of Wisconsin, was recently elected chairman of the Milwaukee Chapter of the American Society for Metals.

Harry H. Reich has been appointed sales representative in the Birmingham area for Modern Equipment Co., Port Washington, Wis. Mr. Reich has been engaged in the sale of foundry equipment for over 25 years. **Harry C. Reich** is associated with his father as sales engineer.

C. C. Fuller was appointed vice president, **H. O. Ehrisman** general sales manager, and **J. J. Burnett** field sales manager, Foxboro Co., Foxboro Mass. **C. E. Sullivan,** since 1920 sales manager, who recently retired from active sales direction, will serve in a consulting capacity with the sales organization. Mr. Fuller, with the company since 1920, has been assistant general sales manager since 1941. Mr. Ehrisman, who joined the company in 1936, became manager of sales promotion in 1945 and assistant general sales manager in 1949. Mr. Burnett, during 30 years with Foxboro, was sales engineer, Chicago branch manager, and more recently manager of the Central division. Mr. Sullivan retires after 45 years active service.

Wallace J. Keith was named sales engineer in the new office recently opened at 627 Salem Ave., Dayton 6, by Acheson Colloids Co., Port Huron, Mich. Mr. Keith was graduated from Northwestern University and for the last 4 years was associated with Ford Motor Co., Dearborn, Mich.

Vincent E. Lysaght, formerly divisional manager of the Helicoid, Campbell Machine, and Wilson Divisions, American Chain & Cable Co., has been appointed general sales manager of American Chain, with headquarters in the New York office. A graduate of Massachusetts Institute of Technology, Mr. Lysaght is a recognized authority on hardness testing of metals.

Dr. Arthur G. Metcalfe, since 1953 research metallurgist, Armour Research Foundation, Illinois Institute of Technology, Chicago, has been appointed senior metallurgist. Dr. Metcalfe was with Deloro Smelting & Refining Co., Deloro, Ont., prior to joining the Armour Foundation.

James G. Dick was recently named district manager, Montreal Bronze Ltd., subsidiary of Canadian Bronze Ltd., both of which are located in Montreal, Que.

DeWitt L. Shelly was appointed manager of a special products group recently established by Air Brake

HARRY H. REICH
. . . *foundry equipment sales*

WALLACE J. KEITH
. . . *Joins Acheson Colloids*

VINCENT E. LYSAGHT
. . . *becomes general sales mgr.*

DeWITT L. SHELLY
. . . *special products mgr.*

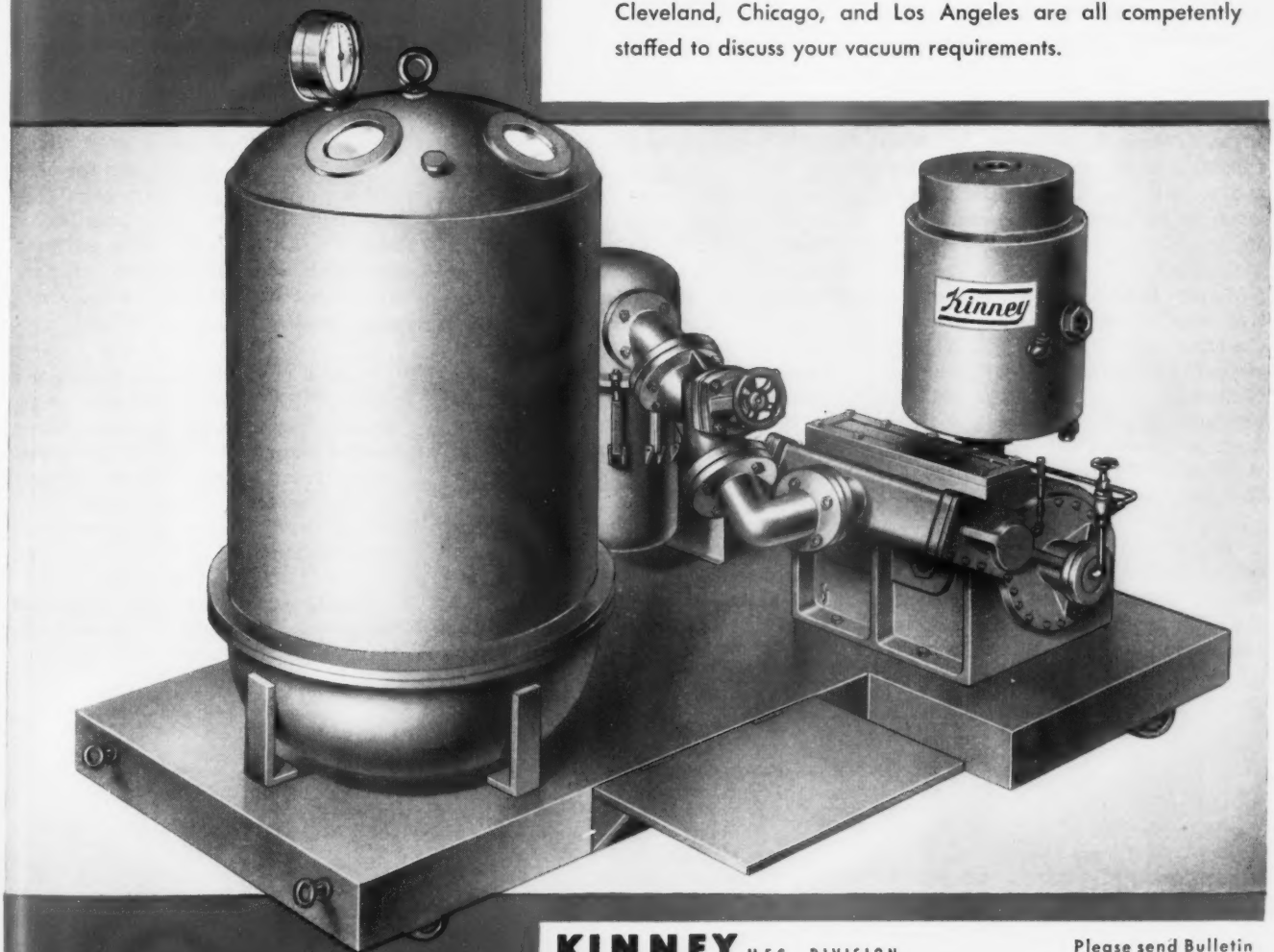
IMPROVE YOUR CASTINGS SIMPLY AND ECONOMICALLY

A few advantages . . .

- Greatly reduced porosity
- Cleaner castings
- Elimination of chemical and gas flushing
- Improved physical characteristics of casting
- Utilization of lower grade secondary metals

The new Kinney Mobile Vacuum Degasser with its efficient Kinney Model KDH-130 Vacuum Pump provides rapid pump-down to low pressures. The pump is effectively gas ballasted for eliminating contamination by water and other condensable vapors — a primary requirement for efficient foundry operation.

The complete unit is designed and manufactured by Kinney especially for the foundry industry. It eliminates costly impregnation processes, is simple to operate, and rugged in design . . . dependable, trouble-free, efficient. It will pay you to get the full story. Our district offices in Boston, New York, Philadelphia, Cleveland, Chicago, and Los Angeles are all competently staffed to discuss your vacuum requirements.



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KINNEY MFG. DIVISION
THE NEW YORK AIR BRAKE COMPANY
3638 WASHINGTON STREET • BOSTON 30 • MASS.

Please send Bulletin describing the Kinney Mobile Vacuum Degasser.

Name .....

Company .....

Address .....

City ..... *State* .....

Division, Westinghouse Air Brake Co., Wilmerding, Pa., to expand manufacturing and marketing activities.

George A. Hinckley was appointed general sales manager, Automatic Transportation Co., Chicago, succeeding **Foster W. Lamb,** who has resigned. A graduate of Harvard University, Mr. Hinckley formerly was manager of the company's New York factory branch and more recently sales manager of rider-type trucks made by Automatic. **William D. Black,** for 10 years associated with P. W. Voss & Associates, Automatic's Chicago representative, has replaced Mr. Hinckley as sales manager. Mr. Black is a graduate of University of Illinois.

Charles Bultman has been transferred to the field sales department, Pangborn Corp., Hagerstown, Md., to engage in sales promotion of new blast equipment. **David Bair** has succeeded Mr. Bultman as manager of the Detroit district. **Robert Treglown** and **C. H. McKinsey** have been named sales engineers in the Detroit office. **James G. Richeson** has been appointed sales engineer and assistant to district manager E. C. Gilmour in St. Louis and Kansas City, Mo.

Wayne Belden, since 1953 executive vice president, Ajax Flexible Coupling Co., Westfield, N. Y., was elected president of the company. **Charles W. Belden** was named vice president, **Harley E. Northrop,** treasurer, and **Robert G. Cady,** secretary. **William T. Welch** is chairman of the board of directors.

Robert E. Wolfensperger, until recently senior sales engineer, Refractories Division, the Carborundum Co., Perth Amboy, N. J., has been transferred to the Pittsburgh district office as refractories engineer in that area. A graduate of University of Illinois, he joined the company in 1952. Previously he was associated with Bethlehem Steel Co., Bethlehem, Pa.

Frank S. Brewster has been appointed foundry consultant, Brumley-Donaldson Co., Los Angeles, suppliers of industrial materials and technical and laboratory assistance.

FRANK S. BREWSTER
. . . joins Brumley-Donaldson

Mr. Brewster was graduated from Michigan State College and spent over 25 years in sand and metal control in the foundry industry. Previous associations include chief chemist, Saginaw Malleable Iron Division, GMC, and chief metallurgist, Baker-Perkins Inc., both of Saginaw, Mich., and sand engineer, Dow Chemical Co., Magnesium Division, Midland, Mich. In 1946 he joined Harry W. Dietert Co., Detroit, where he was sales manager, vice president and general manager. Recently he has been engaged in establishing a quality control program for South Gate Aluminum & Magnesium Co., South Gate, Calif. Active in committee work of the American Foundrymen's Society, Mr. Brewster is national chairman of its Sand Division.

Earle D. Moiles Jr., formerly sales field engineer, has been named district manager of the Boston office, Leeds & Northrup Co., Philadelphia, succeeding **Paul K. Welch,** who has become New York manager. Mr. Moiles joined the company in 1917 after graduation from Carnegie Institute of Technology. Mr. Welch has been with Leeds & Northrup since 1927, when he was graduated from University of Pennsylvania. **Harold L. Scutt,** former manager of the New York office, was recently named manager of the sales engineering division, Philadelphia, as reported in May.

Stephen Stillwell has been appointed sales representative in southern Ohio and northern Kentucky for Samuel Greenfield Co., Buffalo, with headquarters in Cincinnati. **Frank Clark** was named ingot sales representative for the company in the Cleveland and northern Ohio territory.

Frederick T. Jordan was appointed eastern district sales manager, Electro-Alloys Division, American Brake Shoe Co., with headquarters in West Hartford, Conn. A graduate of Boston University, he joined the company in 1946.

Wilfred G. Shedd has been assigned to the Chicago heat treat sales engineering department, Surface Combustion Corp., Toledo, O. Since graduation from Michigan State College in 1950 he has worked in the company's development and field erection departments.

Donald A. Kilb has been appointed Cleveland district representative, Hammond Machinery Builders Inc.,

ROBERT E. WOLFENSPERGER
. . . refractories sales

WILFRED G. SHEDD
. . . Surface Combustion sales

DONALD A. KILB
. . . Hammond Machinery sales

It's the low-cost producer who gets the order

SOME people think it's more important to build a strong sales organization than it is to invest in modern production equipment.

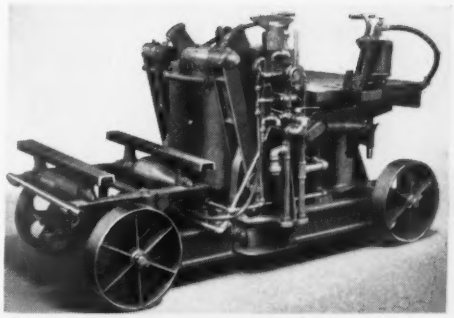
But, no salesman has ever been able to sell *on a continuing basis* against the lower prices of a competitor.

- To compete successfully in the foundry business you must produce castings at a cost low enough to attract buyers.
- To keep your costs low you must provide your foundrymen with every possible means of cutting unit cost and eliminating lost production time.

It's as simple as that.

How much does it *cost* to become a low-cost producer? Actually, nothing at all. When you install a modern Tabor Molding Machine on a job-plan basis, it pays for itself.

And it requires a surprisingly small outlay of capital. Talk to a Tabor engineer today, without obligation. Or write for Catalog.



Tabor Shockless Jar Rollover for the Low-Cost Producer

Produces 250% to 400% more castings than by floor molding . . . 50% more castings than an obsolete molding machine. Tabor makes a complete range of shockless jar rollovers, from 600 to 3000 lb. jar. A piece of chalk balanced on one of these machines will not fall over even under the heaviest jar — that's what we mean by the Tabor "shockless jar" which prevents damage to finished cores on the racks, in the ovens or on the machine, awaiting removal.

Flask Lift Machines • Squeezers and Jar Squeezers
Jarring Machines • Rollover Machines
Abrasive Cut-Off Machines • Vibrators

The TABOR TRADE 1884 MARK Manufacturing Co.
Division of
TURBO MACHINE COMPANY
LANSDALE, PA.

Kalamazoo, Mich., to handle the company's line of grinders, lathes and dust collectors.

Dr. William J. Harris has been named assistant to the director, Battelle Memorial Institute, with headquarters in its Washington office where he will represent the institute in its relationship with governmental organizations that sponsor research in Battelle laboratories. Dr. Harris joined the institute a year ago. **H. Maurice Banta** has been named technical adviser in Columbus, O. He has directed metallurgical research at Battelle since 1942.

John J. Green was appointed service engineer in the Pittsburgh office, Vanadium Corp. of America, New York. A graduate of Carnegie Institute of Technology, for the past 10 years he was associated with Universal-Cyclops Steel Corp., Bridgeville, Pa.

JOHN J. GREEN
. . . Vanadium sales, Pittsburgh

Harry L. Quinn was appointed treasurer, and **William H. Worrilow Jr.,** vice president-sales, Lebanon Steel Foundry, Lebanon, Pa. Mr. Quinn succeeds his father, the late Thomas S. Quinn, co-founder of the company, and will continue as general manager. **John H. Boyd** was appointed general sales manager, the position formerly held by Mr. Worrilow.

Norvall M. Hunthausen, St. Louis district sales manager, Mexico Refractories Co., Mexico, Mo., was appointed assistant secretary-treasurer of the Southwest section of the National Open Hearth Committee of the American Institute of Mining and Metallurgical Engineers. He succeeds **H. W. Gethin** of Laclede-Christy Co., St. Louis, who was transferred to Pittsburgh.

Harold M. Schudt was elected president, Canadian Allis-Chalmers Ltd., Lachine, Que., succeeding **Mark C. Lowe,** president since 1951, who resigned recently. Mr. Schudt joined Allis-Chalmers Mfg. Co., Milwaukee, in 1929 and worked in the general machinery division and tractor division until 1935 when he went to England to start manufacturing operations there. Last year he became assistant to the tractor division's vice president and director of engineering.

Paul H. Hamilton has been assigned to the Chicago sales territory, Jeffrey Mfg. Co. **Guenther Buergel** has been transferred to the Detroit area and **Alva R. Judkins** to the Pittsburgh district. The men were formerly salesmen in the home office in Columbus, O.

NORMAN J. HENKE, elected vice president and plant manager, Fanner Mfg. Co., Cleveland, as reported in May

H. Wynn Gethin was appointed Pittsburgh district sales manager, Laclede-Christy Co., Division of H. K. Porter Co., St. Louis. He has been with the company since 1944 in production and sales capacities. **Burton N. Wright,** formerly assistant district sales manager in St. Louis, has succeeded Mr. Gethin there as district sales manager. Mr. Wright joined the company in 1947 and previously was sales representative in Memphis, Tenn.

George H. Woodland, formerly manager of industrial field sales, was appointed general sales manager for industrial divisions of Chain Belt Co., Milwaukee. He joined the company in 1938.

John Bermingham, formerly sales representative, E. F. Houghton & Co., Philadelphia, has been appointed western sales manager, succeeding the late W. A. Fletcher. Mr. Bermingham will continue to be located at the company's West coast plant in San Francisco. He is chairman of the San Francisco Chapter of the American Foundrymen's Society and a former chairman of the local chapter of American Society for Metals.

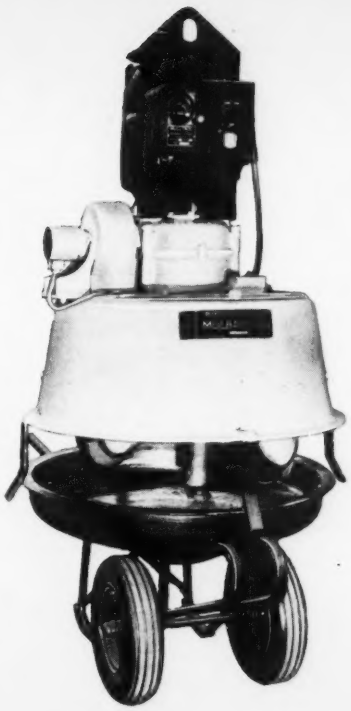
Paul von Colditz, formerly assistant foundry superintendent, has been appointed assistant plant manager, Steel Foundry Division, Canadian Car & Foundry Co. Ltd., Montreal, Que.

P. E. Cavanagh, since 1948 assistant director, Department of Engineering and Metallurgy, Ontario Research Foundation, Toronto, Ont., recently was appointed director of the department. Mr. Cavanagh's previous connections include Steel Co. of Canada, and Allen B. Du Mont Laboratories Inc.

P. E. CAVANAGH
. . . Ontario Research Foundation

Roderick L. Smith has been appointed abrasive engineer in the Minneapolis area, Norton Co., Worcester, Mass., succeeding **W. Grover Snow,** who retired after nearly 40 years with the company. Mr. Snow worked in the order service department and laboratory before being assigned to sales. Mr. Smith joined the company in 1951 and since 1952 was field engineer in Chicago.

Howard S. Bunn was elected executive vice president and member of the executive committee, Union Carbide & Carbon Corp. With the company since 1922, he previously was vice president of Carbide & Carbon Chemicals Co., and president of Bakelite Co. He became vice president and a director of the parent company in 1953.



FOR LOW COST PREPARATION OF COATED SHELL MOLDING AND SHELL BLOWING SAND

the new SHELL MULBARO

Improved quality and lower costs have initiated the trend to coated shell molding sands. Thorough uniform mulling and careful batch control are essential in the preparation of coated sands for shell molding and shell blowing processes. Yet, it's important to keep costs in line if the foundry is to succeed in this highly competitive market.

The shell Mulbaro is designed to meet these needs. It thoroughly mulls and fully prepares coated resin-sand mixes for the "C" or "D" processes using either the wet or dry mixing process. Yet, it's low installation cost and especially low operating costs help the foundry to improve its competitive position. The shell Mulbaro has all the extreme flexibility of the Mulbaro and a single Mulbaro mulling mechanism may be used with several portable mulling bowls.

and the standard MULBARO

FOR NON-COATED RESIN-SAND MIXES AND FOR MOLDING AND CORE SANDS

Of course, the standard Mulbaro with its rubber-tired, spring-loaded mulling wheels and scientifically designed contoured mulling bowl is still the best choice for the foundry that requires small portable mulling equipment. Molding sands, core sands, and conventional resin-sand mixes are mulled with perfect uniformity in short time cycles.

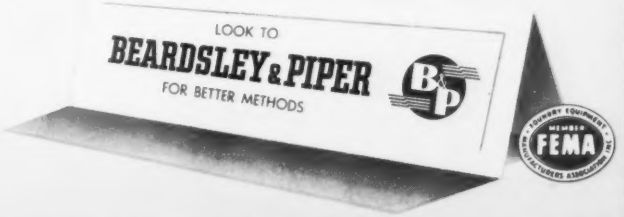
One Mulbaro mulling mechanism can be used with several barrows permitting the foundry to obtain the capacity of several mixers at little more than the investment required for one. The mulled sand may be delivered directly to molder or coremaker in the barrow in which it is mulled.

FOR BOTH THE MULBARO AND SHELL MULBARO

MULLTROL MEANS CONTROL

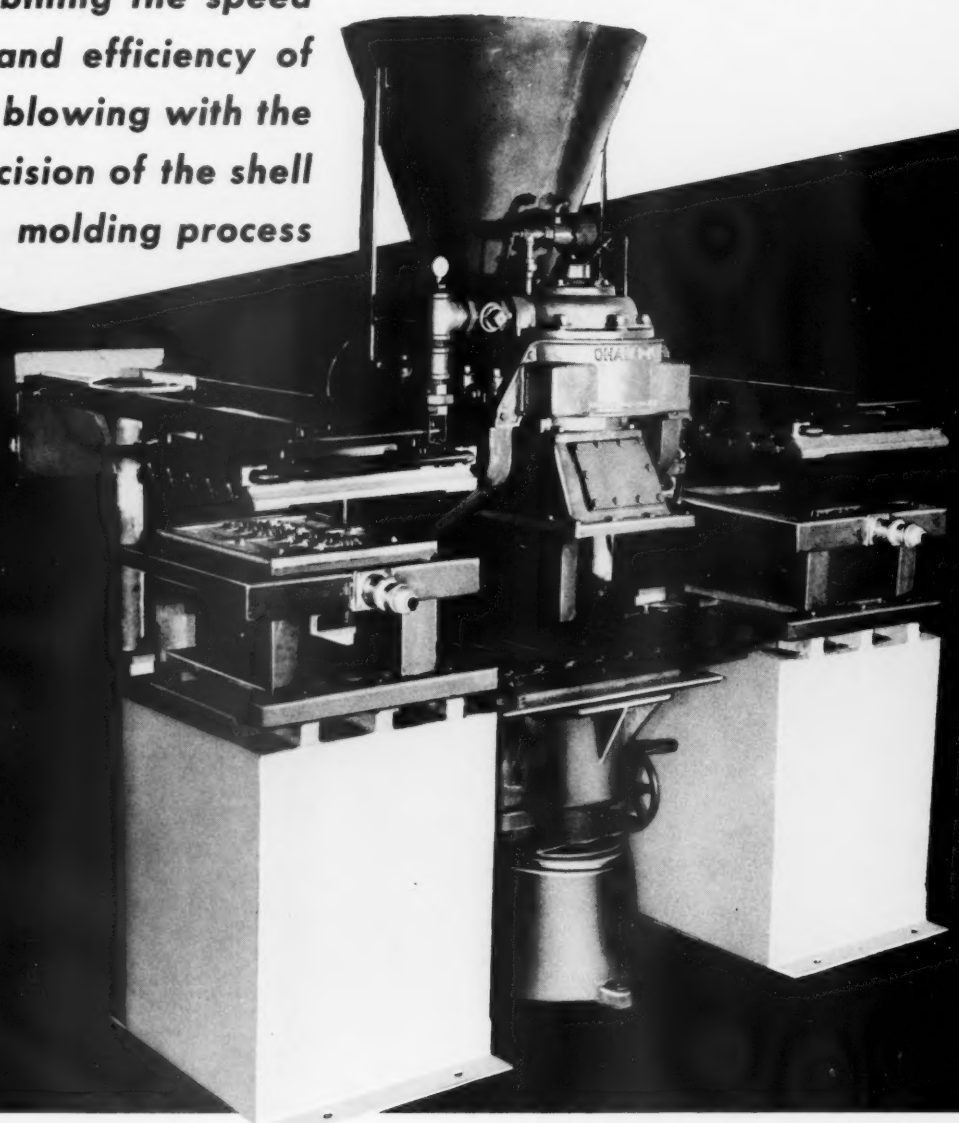
As labor costs continue to rise and quality becomes more and more important, automatic or semi-automatic control of foundry processes has become essential. Mulltrol exactly controls the length of the mulling cycle, assuring absolute batch uniformity and eliminating time-consuming, power-consuming overmulling.

Write now for full information to *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Ave., Chicago*



SHELL **BLOMATIC**

combining the speed and efficiency of blowing with the precision of the shell molding process

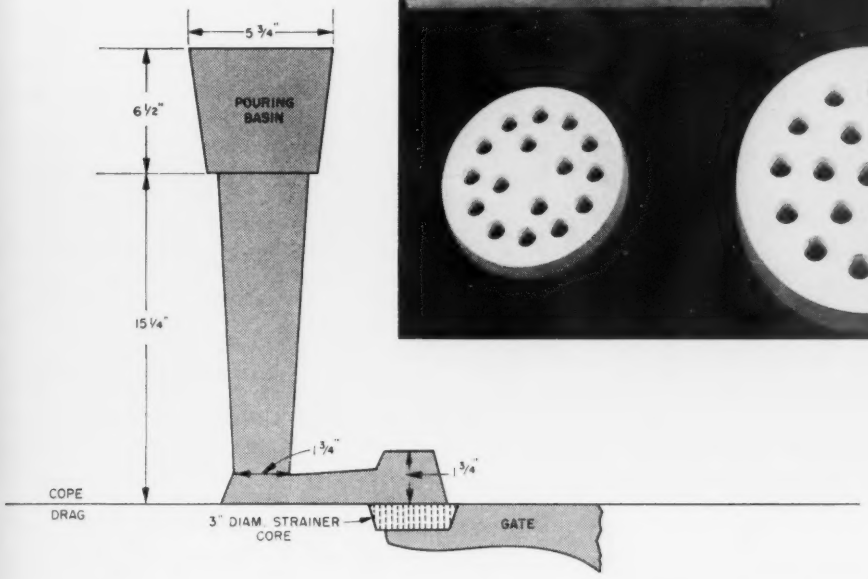


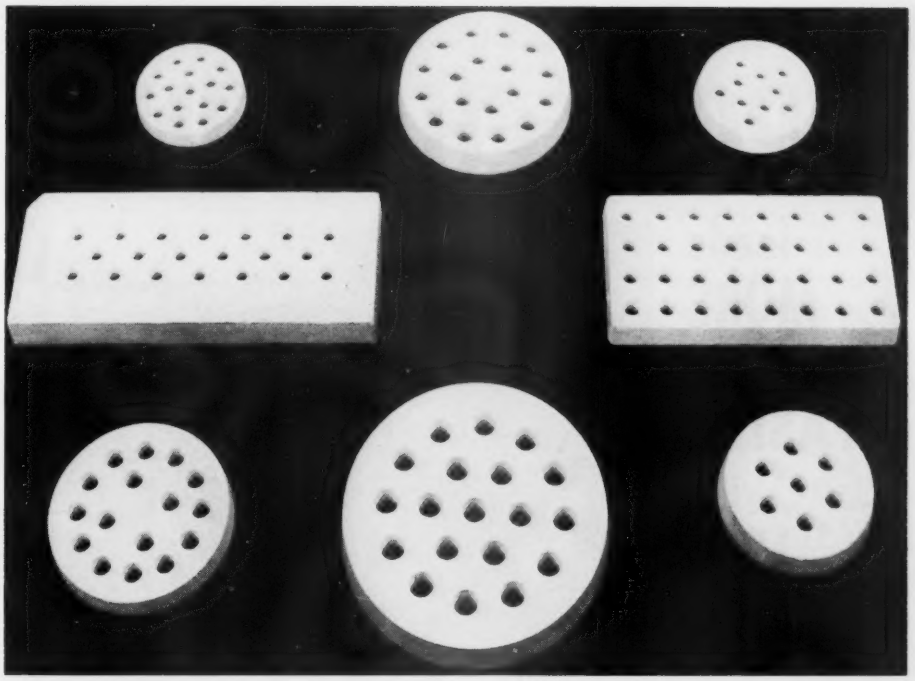
The new B&P shell Blomatic units now make possible the production of precision shell molds on a core blower type unit, with all of the speed and efficiency of the blower type of operation. In a shell Blomatic unit a B&P Champion blower replaces the sand box equipment used with B&P shell Formatic units. Instead of a rainfall of shell molding sand onto the pattern, sand is blown into a box. A few of the advantages of the shell Blomatic type of operation are:

1. Higher production.
2. Controlled contour of back of shell to permit use of clamp type pouring fixtures, eliminating backup material.
3. Thinner shells.
4. Simpler production cycle.

The shell Blomatic units feature the same unit package design of the shell Formatic units. A foundry may start with the simple components shown above—blower, curing furnace, and stripping unit—and later incorporate them in a complete rotary automatic unit. The cost of the simplest type of installation is only a small amount more than that required for very crude dump box installations. Yet, production cycles of two shells per minute are possible and the simple components offer all of the quality features so essential to successful shell molding. Write for full information. *Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Illinois.*

Below—Gating system in which more than 300 lb of metal flows through one strainer core. This service requires a core that will not collapse before the mold is full





A few of the various shapes in which strainer cores made of ceramic material are obtainable. (Photo courtesy of Williston & Co., Delta, O.)

STRAINER CORE

Types and Applications

STRAINER cores have been used widely in the foundry industry for many years. Actually, the term "strainer" is somewhat of a misnomer in that the principal effect of the core is to choke the metal flow. This choking effect allows the slag to rise and be trapped above the strainer core.

The only time the core acts as a strainer is when it keeps back pieces of slag which are larger than the holes in the strainer core. These cores are generally placed in the bottom of the pouring basin or between the sprue and the gate.

Until fairly recently strainer cores were made largely of baked sand mixtures. Ceramic cores were introduced shortly after the war and have been used at an increasing rate since that time. A study made by FOUNDRY a short time ago showed that more than one-half of all foundries employed strainer cores; at that time 15 to 20 per cent of these users had adopted the ceramic type of core.

Malleable and gray iron foundries are the largest users of strainer cores. Generally they are not employed in casting steel. Brass and bronze foundries use both sand and ceramic types, while aluminum and magnesium foundries prefer metal screens. Experimental work has been done in developing a thin ceramic screen for aluminum castings; also in the development stage is a strainer core stamped from sheets of mica.

Choice of type of strainer core used by an individual foundry is affected by various considerations. Some foundrymen believe that strainer cores are unnecessary. They state that correct gating systems properly choked will prevent slag from entering the mold cavity. However, these foundrymen recognize the value of strainer cores if there is insufficient time to determine the best gating system; or, the quantity of castings ordered may be too small to warrant extensive experimenting with gating system design. In such cases strainer cores may be used.

Some foundries using both sand and ceramic cores select the latter for their more difficult jobs and the former for less exacting requirements. Often a ceramic core is used when a large volume of molten metal passes through one strainer core. The gating system shown in the accompanying sketch is a good example of this class of work. More than 300 lb of iron is poured through a 3-in.-diam strainer core in 25 seconds. Before ceramic strainer cores were used in this gating system, occasional losses occurred through premature disinte-

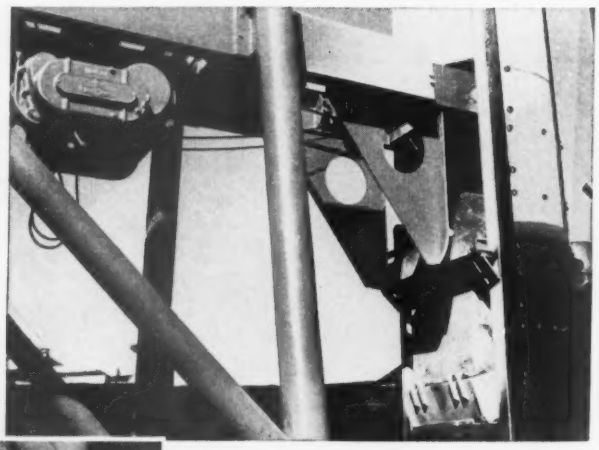
Dimensions of Typical Ceramic Strainer Cores

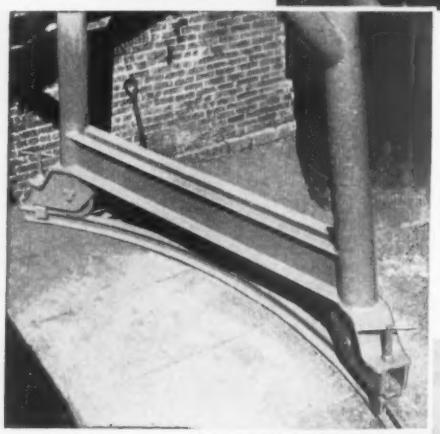
Top Core Diam	Thickness of Core	No. of Holes	Hole Diam	Sq In. Hole Area
1¾"	⅜"	7	5/16"	.539
1 13/16	25/64	7	3/16	.193
1 13/16	3/8	7	¼	.343
1 13/16	9/32	6	¼	.294
2	1/2	5	9/32	.311
2	3/8	10	¼	.490
2 1/16	7/16	8	5/16	.616
2¼	3/8	12	9/32	.746
2 13/32	½	7	5/16	.539
2 13/32	½	7	3/8	.772
2 13/32	½	5	9/16	1.243
2 7/16	11/32	6	13/64	.557
2½	3/8	16	9/32	.994
2¾	½	18	5/16	1.380
2 27/32	5/8	14	¼	.687
3	½	12	3/8	1.320
3	½	18	5/16	1.380
3½	½	19	3/8	2.099

Entirely new method of

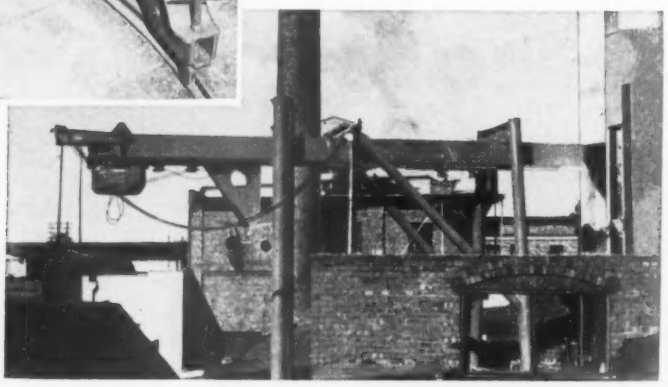
CUPOLA CHARGING

loads MORE and FASTER with LESS HELP





Three views of the Columbiana Automatic Cupola Charger: Top shows close-up of machine; left shows its mobile base; bottom shows complete setup.



The Columbiana Automatic Cupola Charger shown is capable of placing 1000-lb. charges every 1½ minutes. The machine is entirely automatic, but its movements may be controlled by an operator. Services of only two men are required for weighing and placing the charge in the charging bucket. A single control button starts the automatic cycle that lifts the load vertically 25 feet, then carries it horizontally into the cupola, where the bucket is lowered and discharged, after which it returns automatically. This machine is entirely new, but the manufacturers have several sizes available. Call or write:

MACHINE DIVISION

OF

THE COLUMBIANA PUMP CO., COLUMBIANA, OHIO

gration of a sand strainer core. Heat-resistant properties prevent collapse of the ceramic strainer core during pouring.

Various advantages of ceramic strainer cores are cited by foundries favoring their exclusive use. One medium-sized jobbing foundry points out that on large molds strainer cores prevent a vortexing action often caused by suction of the metal as it enters the mold. In this foundry ceramic cores have been found to do a better job than sand cores that were twice as thick; one factor given is that there is less temperature loss when pouring through a thin core than through a thick one.

Adoption of ceramic cores was delayed at this plant because of a fear that the cores being charged with return scrap would in some way affect cupola melting. At present 60 to 70 per cent of the molds use ceramic cores and no effect on the metal has been noticed.

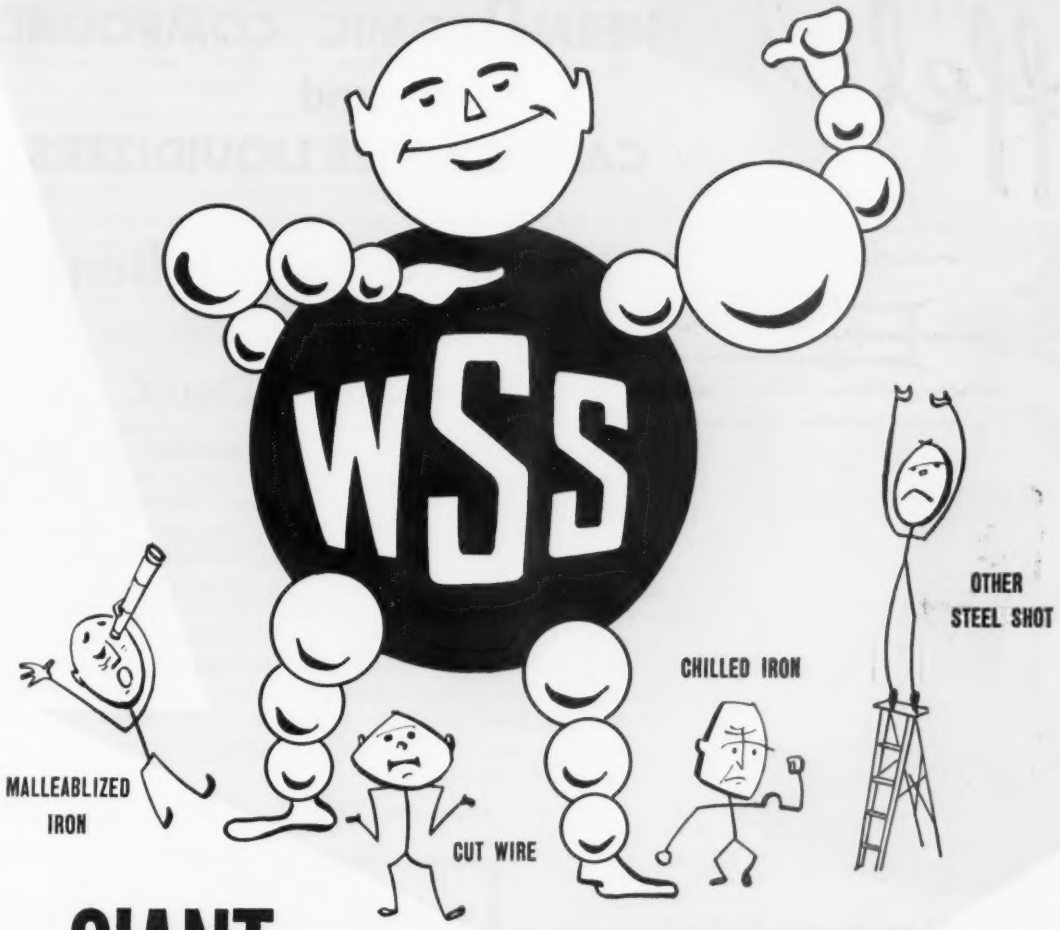
Advantages Overcome Cost

A leading automotive foundry uses ceramic cores on all cylinder blocks, flywheels and many other jobs because their advantages are considered to be worth their additional cost. It says that the fact the ceramic cores are uniform, packaged and ready to use not only eliminates problems of producing, inspecting and storing sand cores, but also removes one variable in the casting process.

Other foundries using ceramic strainer cores report that they get a controlled flow of metal into the mold; this, they say, helps to promote uniformity in size of castings because strains and fins caused by uncontrolled pressure are eliminated. It is felt that a strainer core can make up for some deficiencies in the skill of metal pourers.

Should a sand strainer core collapse or wear away while the mold is being poured, sand will flow into the mold cavity. As one foundryman says, "A poor strainer core is worse than none at all." Ceramic strainer cores by the very nature of their composition and method of manufacture will withstand sudden temperature changes and will not collapse nor break down when metal is poured into the mold.

Sand strainer cores are made of various mixtures of sand, oil and cereal. Multi-gang coreboxes are often used to make large quantities of these cores at a time. The holes in the cores are made with a taper so that they may easily be separated from the corebox. However, these tapered holes can be a liability in pouring a casting; they can open up, causing the top and bottom diam-



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Look at the chart in this ad. These 4 firms have saved 25% to 60% on shot costs by using Wheelabrator Steel Shot. In 2 years over 1,000 firms have changed to Wheelabrator Steel Shot . . . 400 from other steel abrasives. Let Wheelabrator Steel Shot make GIANT savings for you. Start using it today.

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An Ohio Steel Foundry	$1.35/ton cleaned	$.57/ton cleaned	60%
A Chicago Malleable Foundry	$1.10/ton cleaned	$.60/ton cleaned	45%
	STEEL SHOT AND CUT WIRE	WHEELABRATOR STEEL SHOT	
A Steel Processing Plant	5.06 lb./ton cleaned	2.80 lb./ton cleaned	45%
A Cleveland Gray Iron Foundry	$.465/ton cleaned	$.25/ton cleaned	46%

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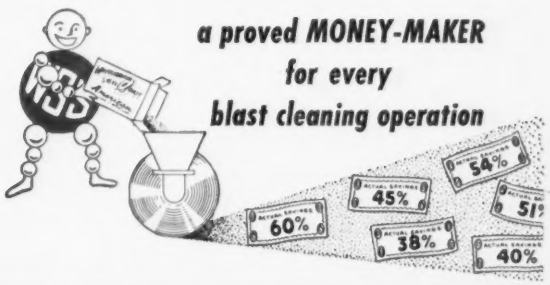

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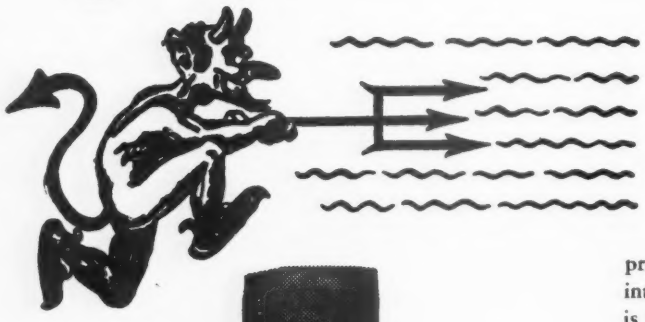
Soffel's

THERMOTOMIC® COMPOUND and CARBON FREE LIQUIDIZERS



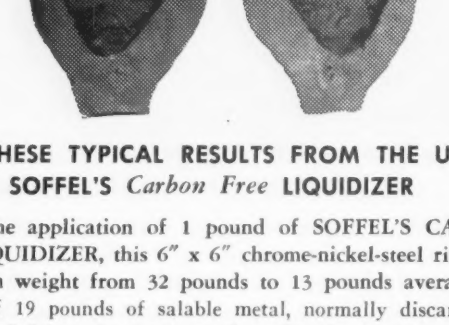
Keeps Metal Molten!

for Steel, Iron, Aluminum Brass, Bronze, Copper

THERMOTOMIC "X" is a patented exothermic compound that produces a temperature over 3500° F. It can be molded or baked into any desired shape the same as sand cores. THERMOTOMIC "X" is used as knock off core rings with 1½ inch feeder opening under risers of feeding heads, also as insulating sleeves, inserts and facings, or mixed with facing sand where it is desired to maintain fluidity of the casting metal. Shorter and more compact heads and risers can be used. The small feeder opening permits easy removal of feeding heads and risers. In conjunction with THERMOTOMIC COMPOUNDS, we recommend the use of exothermic CARBON FREE LIQUIDIZER NO. 5 on top of the metal in the heads or risers as an insulating cover. For green sand casting molds, use THERMOTOMIC WP (Waterproof).

U. S. Patents No. 2,490,327 and No. 2,500,097

300 lb. aluminum bronze bearing cap cast with THERMOTOMIC feeding ring core under riser. Note small feeder opening which facilitates removal of riser from casting, resulting in greatly reduced cleaning costs.



NOTE THESE TYPICAL RESULTS FROM THE USE OF SOFFEL'S *Carbon Free* LIQUIDIZER

With the application of 1 pound of SOFFEL'S CARBON FREE LIQUIDIZER, this 6″ x 6″ chrome-nickel-steel riser was reduced in weight from 32 pounds to 13 pounds average. A savings of 19 pounds of salable metal, normally discarded as scrap, was fed into the casting and produced a heavier, sounder casting. Note the feeding head can be knocked off easily, saving burning costs. There is no better feeding head compound at any price than SOFFEL'S CARBON FREE LIQUIDIZER.

THERMOTOMIC *Strainer Core* PRODUCES MONEL CASTINGS 270 LBS. SOLID

Made by direct pouring through the Thermotomic strainer core under the feeding head.

No chills were used, no shrinkage at the flange. Note depth of shrinkage in the feeding head.

BEWARE OF IMITATIONS! We are the originators of CARBON FREE LIQUIDIZER and THERMOTOMIC COMPOUNDS

PITTSBURGH METALS PURIFYING COMPANY

1352 MARVISTA ST., N.S. PITTSBURGH 12, PA.

WORLD'S LARGEST MANUFACTURERS OF FLUXES AND PURIFIERS FOR ALL METALS AND ALLOYS

eters to become the same. This small amount of sand washed away enters the mold cavity.

Ceramic strainer cores are made in steel dies from highly refractory materials. The cores are pressed by mechanical means to about 2000 psi and then fired in a kiln. Steel dies machined to close tolerances are used to form the cores. Pins in the dies are designed with no taper or draft, and the core is removed from the die by mechanical means.

The accompanying table shows some of the standard sizes in which round ceramic strainer cores are available from manufacturers' stocks. Square, rectangular or other shapes also are obtainable.

Steel Foundry Uses Private Plane To Good Advantage

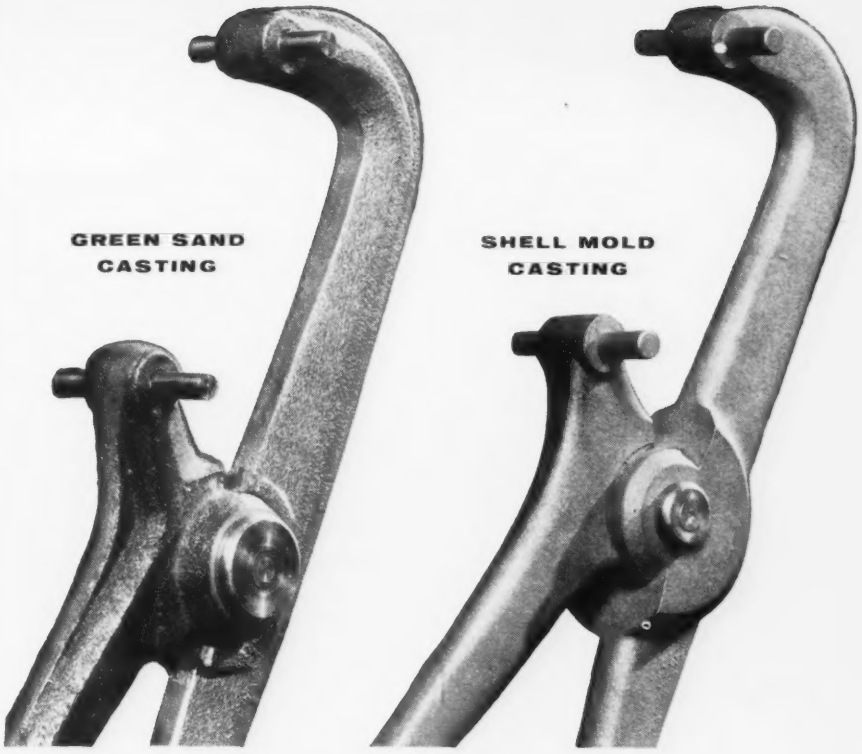
Empire Steel Castings Inc., Reading, Pa., recently completed the first anniversary of its flight service and has evaluated the advantages of a company-owned plane as a guide to other firms.

Empire uses its plane, a Navion 260, to 1) interest potential customers and develop new business in new territories, 2) provide faster freight service in emergencies and 3) transport plant personnel for sales, service and inspection at great savings in time. On all three counts, flight service has been a distinct advantage, according to Sales Manager Bradley B. Evans.

The plane was purchased a year ago to provide quick response to calls from the firm's customers in the eastern industrial area. Business also has been developed since in the South and the Southwest. During the first eight months of service, for which records have been compiled, a total of 50 such flights were made, covering 11,000 customer miles. In addition to developing business in distant areas, the plane makes routine trips every six months on customer courtesy calls.

In the field of emergency freight service, the plane has saved as much as 10 days on a priority item. In at least one instance, it made possible finishing a job on time that could not have been handled had the company depended on conventional methods of shipment. In this case, the aircraft delivered over 700 lb of castings.

In the service of Empire personnel, the plane made more than 200 flights, as far from Reading as Los Angeles, and carried plant personnel more than 117,315 air miles. This figure represents 1000 passenger hours.



WHICH *would help you build* **PROFITABLE** *business?*

A look tells a lot — but not all. The best green sand castings for these clamp spring spreading tongs required costly finishing. After the changeover to shell molds made with Durez Foundry Resin the customer said —

"Close tolerances are now obtained in the casting rather than by machining." Shell molding saved a drilling and pressing operation to place the finger pins — in shells the pins are molded-in. Also eliminated were spot facing to close tolerances and over-all hand finishing with extensive filing preparatory to plating.

The economies of shell molding — for the foundry and its customers — are available at their best with Durez Foundry Resin. Fast-curing, rigid-setting, this resin produces extremely smooth surfaces and minimum parting lines. There's no warpage, less scrap, fewer rejects. Let it help you build profitable business.

Castings by Lakeside Bronze, Inc., for Hanau Engineering Co

DUREZ

PHENOLIC RESINS

MOLDING COMPOUNDS
INDUSTRIAL RESINS
PROTECTIVE COATING RESINS

Made by America's largest producer of phenolic plastics exclusively.

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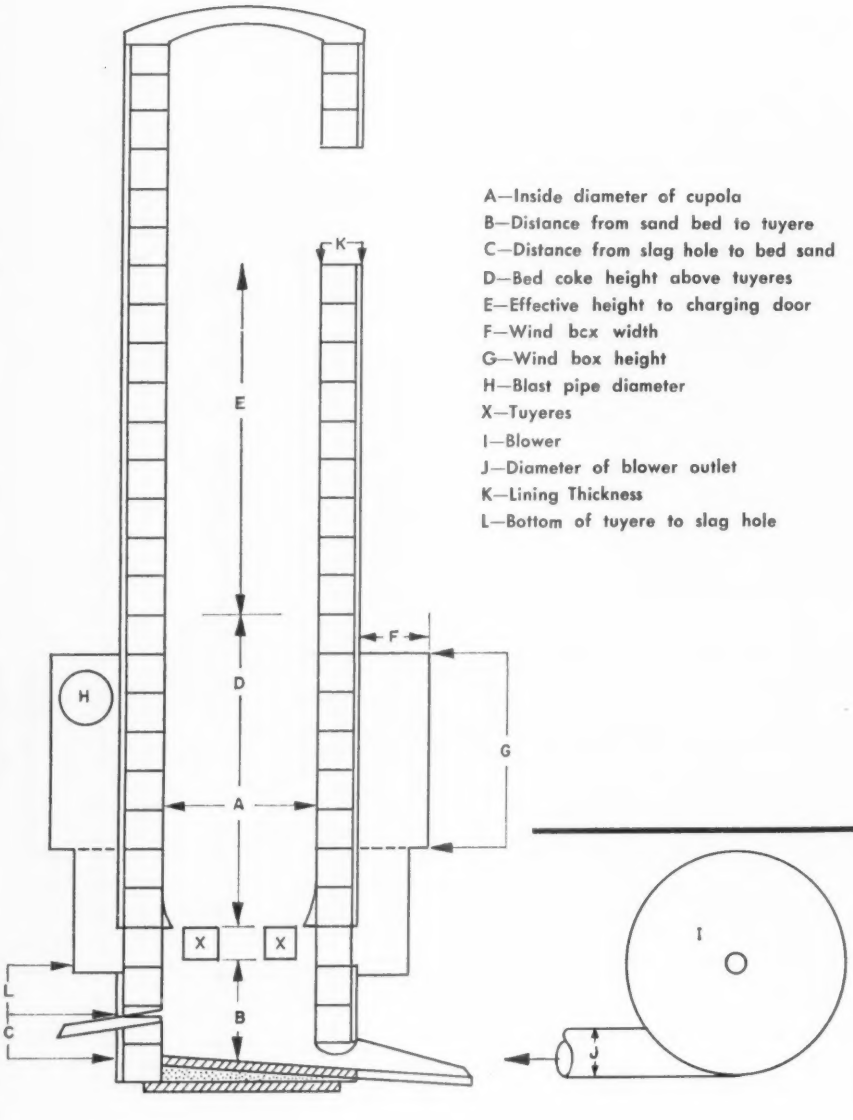
SHELL MOLD RESINS THAT FIT THE JOB

Trouble Shooting

By C. W. AMMEN



1. Approximate capacity of cupola in lb per hr=.7854 $A^2 \times 7$.

2. Total area of tuyeres measured at the shell side=.7854 $A^2 \div 8$. This figure divided by the number of tuyeres equals total area per tuyere at the shell opening.

3. Approximate air required through the tuyeres=30,000 cu ft per ton melted or 150 cu ft per pound of coke per hour. 0.7854 $A^2 \times 7 \times 150 \div 60$=cfm air through the tuyeres.

4. Suggested size of blower in cfm=.7854 $A^2 \times 2.5$.

5. Blast pressure: A to 18 in.=8 oz; 18 to 37 in.=16 oz; 37 to 45 in.=20 to 24 oz; 45 to 66 in.=24 to 32 oz.

6. Bed height above tuyeres (D) in in.=$10.5\sqrt{\text{blast pressure}} + 6$.

7. Height (B) from sand bottom to bottom of tuyeres is usually 10 in.

8. L=4 to 6 in. below bottom of tuyeres.

9. Well capacity (pounds of iron)=0.102 A^2C.

10. Effective height to charging door (E)=5A + D.

11. Suggested metal charge (pounds) at 8 to 1 ratio=0.7854 $A^2 \div 1.5$.

12. Coke size should be from 1/10 to 1/12 of A.

13. Limestone required approximately 35 to 45 lb per ton of charge, or .0175 to .0225 lb per lb of charge.

14. Diameter of H should be equal to diameter of J.

15. F should be from 8 to 14 in. wide.

16. G should be from 3 to 4 ft high.

17. K should be at least 4½ in. thick.

Designing a Small Cupola

I see by going back through a large stack of back issues of FOUNDRY that, as regularly as clockwork, someone wants dope on the construction of a small cupola, for sizes from as small as 8 in. ID to 24-32 in. and larger, and each wants the exact dimensions and data for his particular size. In almost every instance, FOUNDRY advises the questioner to get a copy of the AFS *Handbook of Cupola Operation*. This you should do, since all the information you ever could desire is contained in this volume in a simple, easily understood form.

Some cupolas in daily operation would tax the wisdom of Solomon at first sight, but closer investigation will show basic fundamentals common to all stacks.

Stacks smaller than 18 in. ID are, in my opinion, of little or no commercial value, although they may be valuable to a school or in experimental work. If your requirements for iron are so small as to require a stack with a diameter smaller than 18 in. or a capacity less than ¾ to 1 ton per hour, you are better off buying your castings. If you want only a small amount of iron now and

DEAR CHARLIE:

We built a small cupola, using two 55-gal drums as the stack and one-third of a 110-gal drum as the wind belt, coming off the wind belt to the tuyeres with square tuyere boxes. We placed four tuyeres equally around the stack. They're 4 in. square and 12 in. from the bottom of the tuyere opening to the sand bottom. Well, we have tried just about everything we could to get this beast to work—varying bed height, coke ratio, amount of air, etc. What little dope we have on cupola data, some of which is on homemade cupolas, hasn't helped much. One bozo says tuyeres should be from 6 to 10 in. above bottom, and another says from 3 to 15 in. is O.K.

Our cupola melts, but you could carry the tap around in a straw hat. Any dope on small stacks that we can understand?

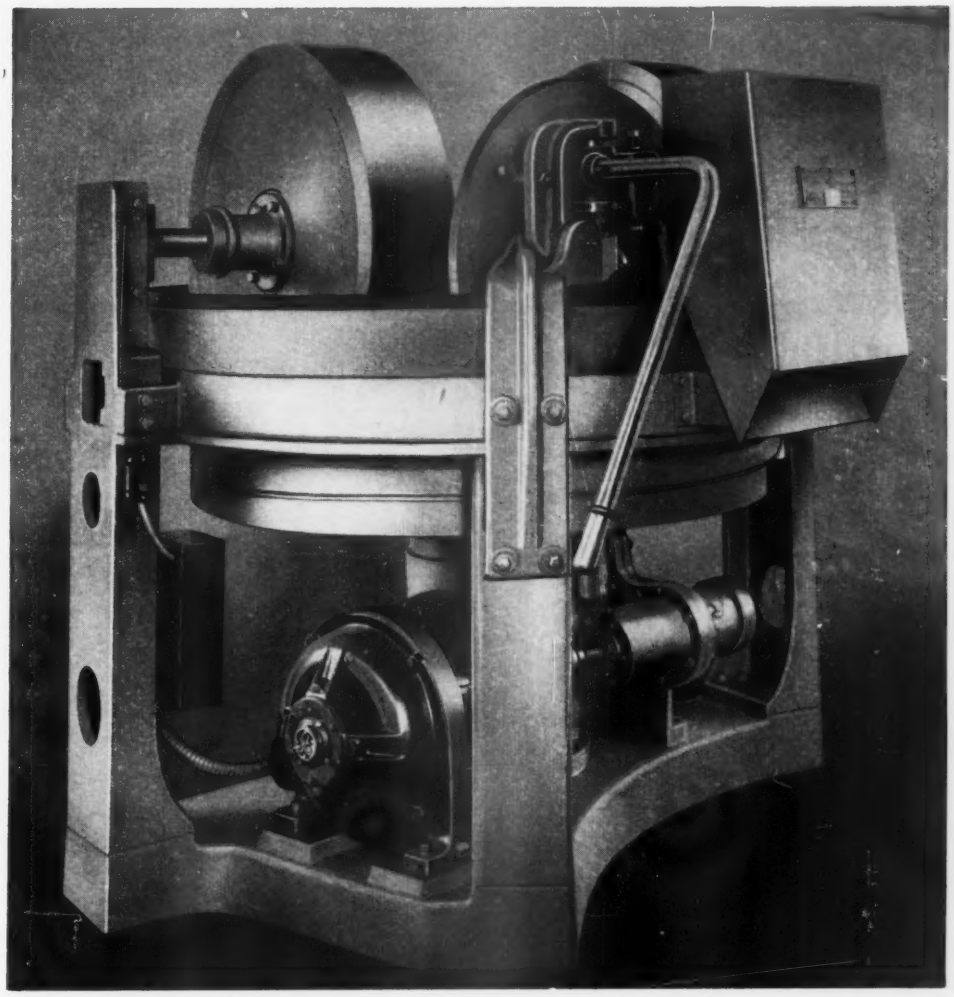
SAM

DEAR SAM:

Boy, you sure sound as if you have had it. Your interest in a small stack and its construction seems to be shared by a great many other birds.

the *Clearfield Mixer*

takes guesswork out of sand conditioning



Quality control in sand preparation begins with the mixing equipment. Clearfield Mixers are engineered and built to give high quality results. Operating on the unique revolving pan principle and fully automatic controls, they assure you of high quality, properly mixed foundry sand. As one of our customers wrote: "Clearfield Mixers are perfect in every respect." You will agree—once you've checked.

Write today for Catalog No. 83. Clearfield Mixers are available in many sizes, for all requirements.

CLEARFIELD MIXER
mixes, tempers, aerates

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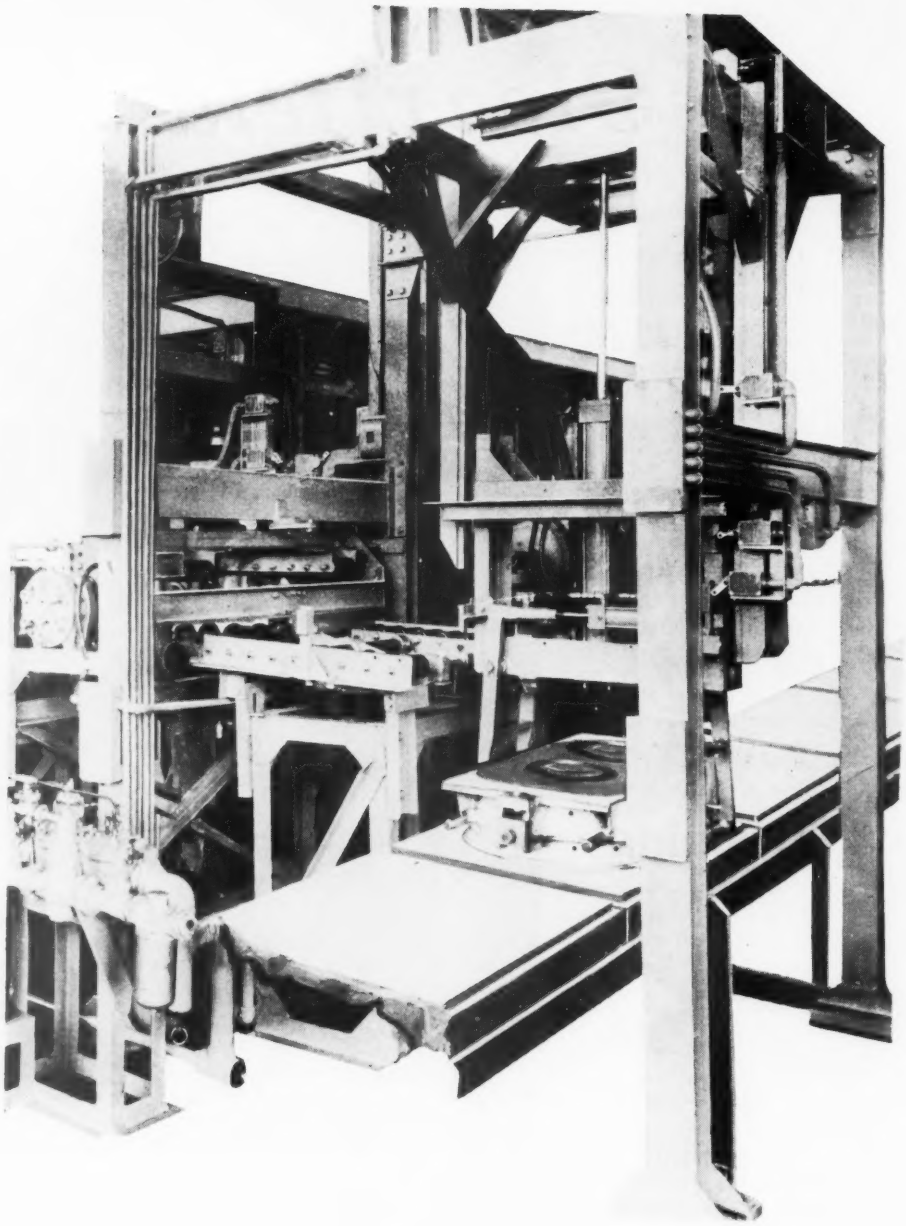
Whatever Your System, Nicholls New Drag Mold Turnover and Transfer Will Save You Man Hours



EASILY ADAPTABLE TO YOUR PRESENT METHOD OF MOLDING

PNEUMATIC . . . AUTOMATIC . . .

Reduce production costs, cure molding bottlenecks, save precious manpower, increase output.

Ask the question . . . "How much manpower would we save per year in having all of our drag molds turned over pneumatically and set off automatically on either our roller or moving car conveyor?"

Then, remember, if it's Nicholls, it's the best molding equipment you can have.

Write for descriptive literature giving specifications on the Nicholls line.

Wm. H. Nicholls Co., Inc., Richmond Hill 18, Long Island, N. Y.

NICHOLLS

then, you can melt it in a crucible. Stacks smaller than 18 in. ID require a magician to operate them properly or economically. Smallness also creates problems about coke size, metal size, getting inside to patch, make the bottom, etc.

The smallest commercial stack available has an inside diameter of 18 in. If you can afford it, your best bet is to purchase a factory-built cupola. If you wish to build a small cupola, however, you first should decide how much capacity per hour you need. The average cupola should, under normal conditions (10 to 1 iron to coke ratio), if constructed properly, melt 10 lb of iron per hour per square inch of cross-sectional area inside the lining. If you are lucky, however, and if all goes well, you might get as much as 7 lb per sq in. It's difficult to make the 10-lb rate!

Let's build a small stack from start to finish. Say that we would like to have about ½-ton iron per hour. Using the figure of 7 lb of iron per hour per sq in. of cross-sectional area, we would need an ID of 13½ in., or 142 sq in. of area.

Need Working Space

Such a stack should give us 1000 lb of iron per hour at its best. This calculation leaves no safety factor, however, and about all you could find to work in this diameter would be a midget. Let's get somewhat bigger. A 16-in. ID would give us 201.06 sq in. at 7 lb per in. We now have about 1400 lb per hour, plus a little more room to work in.

Let's take the stack size first. We have settled on an ID of 16 in. If we line the stack with a standard block, we find that No. A block, 4½ x 9 in., with nine blocks to the circle, will give us a 16-in. ID and a 25-in. OD. So we need a shell with a little more than 25-in. ID. It should be at least ⅛ to ¼ in. thick. This point is important. Don't make the shell too thin. The average oil drum that you speak of will last about as long as the proverbial celluloid dog chasing an asbestos cat through an open hearth.

Now let's see how tall our shell should be. Using the figure of five times the diameter plus the bed height for the effective working height, we come up with a height of 9¼ ft. If we use 9-in. cupola block, 12 courses will give us about 9 ft. We now have a shell and a suitable lining. The shell is 9 ft long, with a 25-in. ID, and is lined with 12 courses of No. A block. Inside diameter is 16 in. Needless to say, don't line the stack now.

Up to this point we have only a shell of the size needed. It goes with-

CESCO RIGHT... before your Eyes!

Now complete protection can be provided to every worker who must do grinding in an area where exhausting of abrasive-laden air is impractical. The CESCO No. 10256 Grinding Hood with its supplied air unit was designed for this service and has proved invaluable in use by hundreds of workers.

The CESCO Grinding Hood slips on quick, and gives complete breathing protection. The air supply is regulated by the wearer to suit his breathing.

The large full-view window is made of acetate and easily replaced when necessary. There is plenty of room inside the hood so the user can wear safety glasses or goggles. Comfortable fitting headgear prevents slipping. The hood is made of durable, washable, double-filled khaki duck. Helmet-headgear combination is fastened to hood by a slide fastener for quick removal and attachment.

•

See your CESCO safety equipment distributor for further information on the CESCO No. 10256 Grinding Hood, or write for details today

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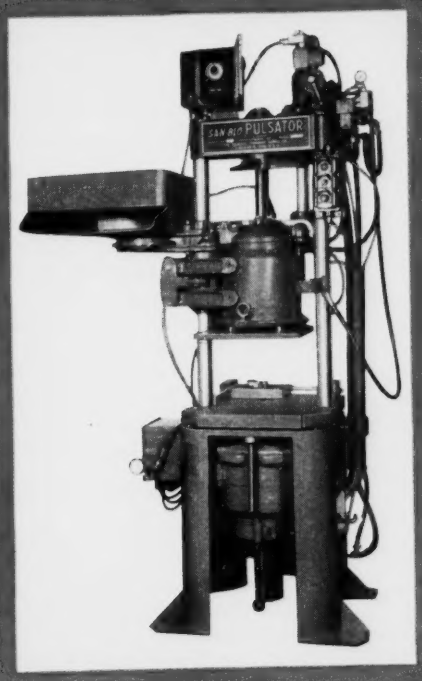
IF you're now hand-ramming cores because...

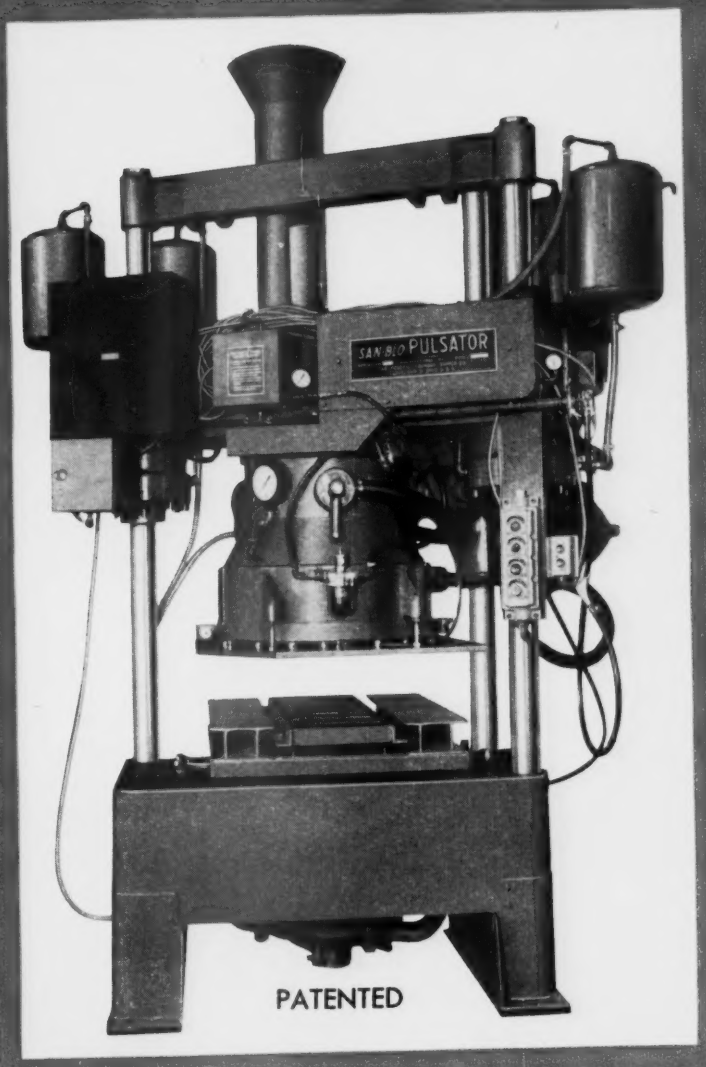
1. Your core sand mixtures *cannot* be blown in conventional core blowers.
2. Moisture content and green bond strength are *too high* for conventional core blowers.
3. Your cores are *too intricate* for conventional core blowers.
4. Your core runs are *too short* — too much time wasted changing sand magazines and otherwise adjusting conventional core blowers.
5. Your core boxes are *made of wood* or are otherwise unsuited for conventional core blowers.
6. Core box wear would be *excessive* in conventional core blowers — core box maintenance prohibitive.

then send for information and learn how you can BLOW

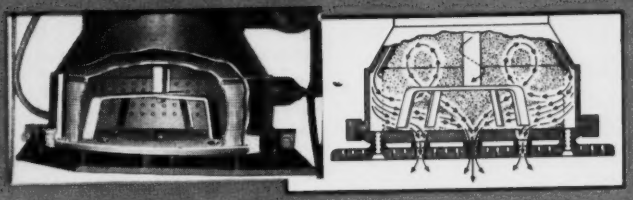
FEDERAL

(below) Model 40-P1-LPP for blowing cores weighing ounces to 40 lbs. each. (right) Model 250P-LPP for blowing cores weighing 5 to 250 lbs. each. Both models have automatic controls, "PULSATOR" for blowing wooden core boxes *safely*, "LPP" for *minimizing* core box wear. Other models available with choice of automatic controls.





ONLY SAN-BLO HAS "MECHANICAL-AERATING ACTION" to eliminate "piping" and "dead spots" in the sand magazine



Motor-driven plows for moving sand to the blow holes.

Aerating air circuit to fluff-up sand moving to blow holes.

on the SAN-BLO

these same mixtures, cores and boxes

San-Blo Division

The FEDERAL FOUNDRY SUPPLY *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

SALES OFFICES IN . . . CHICAGO . . . DETROIT
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WRITE ON COMPANY LETTERHEAD OR FILL IN AND MAIL COUPON

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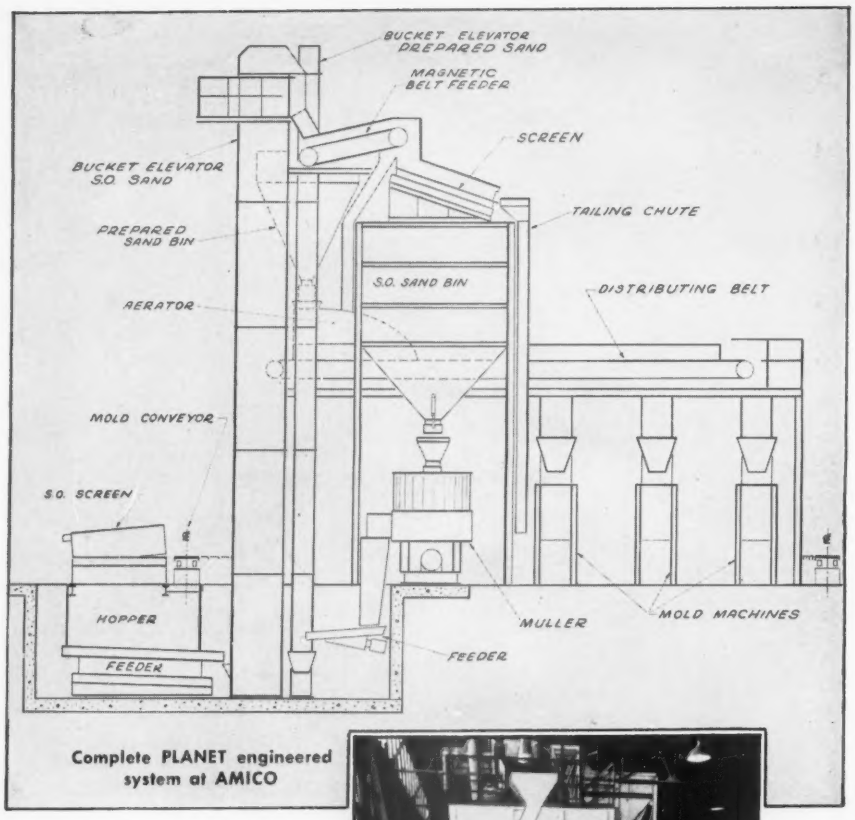
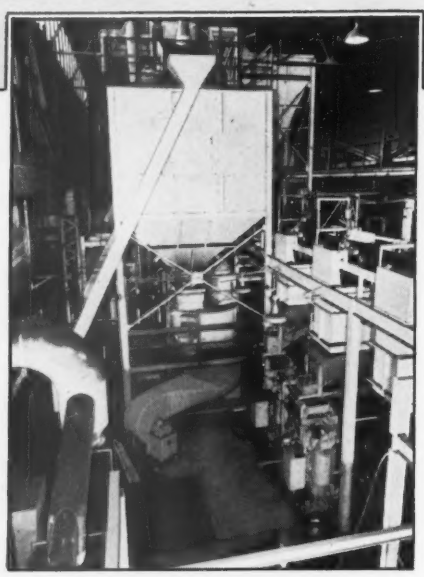
4600 East 71st Street, Cleveland 5, Ohio
Please rush information on the "40" SAN-BLO ☐ "250" SAN-BLO ☐

Name _____ Title _____
Company _____
Address _____ Zone _____ State _____
City _____



Complete PLANET engineered system at AMICO



At Albion Malleable Iron....

Peak Production in 66'x26'

(FLOOR SPACE)

This PLANET system at AMICO furnishes up to 58 T.P.H. of prepared sand, permits excellent quality control, and provides lower handling costs.

PLANET manufactured components include a 150-ton sand bin, sand preparation system, sand distributing conveyor, hoppers, mold conveyor, overhead pouring rails, shake-out and return sand system.

It's good business to follow AMICO'S example and "Plan with Planet", because a *mechanized* foundry is a more *profitable* foundry. WRITE OR PHONE TODAY . . . for information on mechanizing your operation.

PLANET CORPORATION
1818 SUNSET AVENUE
LANSING, MICHIGAN

- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

out saying that we need a base, legs and a suitable bottom door. We will not go into this matter other than to tell you to take your time, make it rigid, provide a good support for the lining, use a cast iron bottom door, and fit it up properly. Once we have the shell mounted on its base, with the bottom door on, we go from there. In front, at the bottom, cut a 4 x 4-in. breast opening; in the back, 6 in. above the bottom, cut a slag hole.

Next step is the tuyeres. This subject is a question of much heated debate and sometimes leads to bloodshed. But the sole purpose of the tuyeres is to supply enough blast evenly to the stack for proper combustion, and this goal can be and has been reached in countless ways.

Regardless of the type and arrangement of tuyeres, the real crux of the whole deal is that the proper volume of air must penetrate the charge. The use of a second set or upper tuyeres also is a much debated subject, about which each side stands by its convictions and at the same time produces good, clean, hot iron.

Determine Tuyere Size

The tuyeres usually are rectangular, from 4 to 6 in. high on standard cupolas, and flared so that the width is greater at the inside of the lining than at the shell opening. They are placed equidistantly around the circumference so that both the taphole or breast opening in the front of the stack and the slag hole in the back fall midway between tuyeres. Ratio of tuyere area to cross-sectional area of the inside diameter can be from 1 to 4 to 1 to 8. This is the total area of all the tuyeres, measured at the outside shell opening.

We now have a 16-in. ID with 201 sq in. of area; so at 1 to 8 you would need a total of 25 sq in. of tuyere area. Thus, if we used four tuyeres, each would require 6¼ sq in. of area at the shell—that is, four tuyeres, 2 in. high by 3⅛" wide or 2.5 x 2.5 in. square or, when they are round, $2\frac{3}{8}$ in. in diameter.

Let's establish a height from the bottom of the tuyere to the bed sand. In 90 per cent of the stacks I have been in both physical and mental contact with, the tuyere bottoms were about 10 in. above the sand bottom. Allowing for the sand, let's measure up 10 in. and draw a line around the shell. Using this line as the bottom of the tuyeres, we lay out four tuyeres equally spaced around the circumference, placed so that both breast opening and slag hole fall between tuyeres. Burn them through the shell, making one tuyere slightly lower than the rest. Directly above the tuyere openings we have

GET YOUR CASTINGS RIGHT IN THE GROOVE

with *fine* FANNER DOUBLE HEAD GROOVESTEM CHAPLETS

finest chaplets ever developed to insure maximum fusion and core support because of these features . . .

1 FEATHEREDGE FUSION RINGS

Knife-like edges on the multiple rings heat instantaneously to fusion temperature — completely sealing chaplet into casting and eliminating leakers.

2 COMPLETE CONTACT RADIUS GROOVES

Molten metal rolls up solidly against the rounded bases of the radius grooves. Greater chaplet area contact results in maximum fusion. No sharp angles to trap gases or weaken stem strength.

3 COUNTERSUNK SHOULDERS

Heavy, tapered shoulders provide solid support to plates — allow full contact with molten metal. No sharp angles to create voids usually formed under heads of ordinary chaplets.

4 FULL STRENGTH

Reinforced construction at all required points provides maximum support without use of extra heavy metal.

5 TIN COATING

The surest protection against rust, as well as aid to fusion. Readily alloys with iron and steel, lowering melting point and improving fusion. Also available in pure copper.

6 PRECISION TOLERANCES

Held to ± .002 on most sizes, Fanner reputation for accuracy is unequalled.

BETTER CASTINGS because of

1. Assured core support
2. Maximum fusion
3. Freedom from leakers
4. Accurate wall thicknesses

• If you haven't investigated the advantages of fine FANNER Groovestem Chaplets for your work, by all means do so now. Foundries everywhere have found that this design has made a tremendous difference in the production of better quality castings because of its extra-strong core support and completeness of fusion. Firms doing critical casting work have confirmed its superiority by standardizing on Fanner Groovestem Chaplets. Get complete information by writing for samples and prices now!

Fanner Groovestem Doublehead Chaplets are made in a variety of styles as shown, in stem sizes from 3/16" to 1⅛".

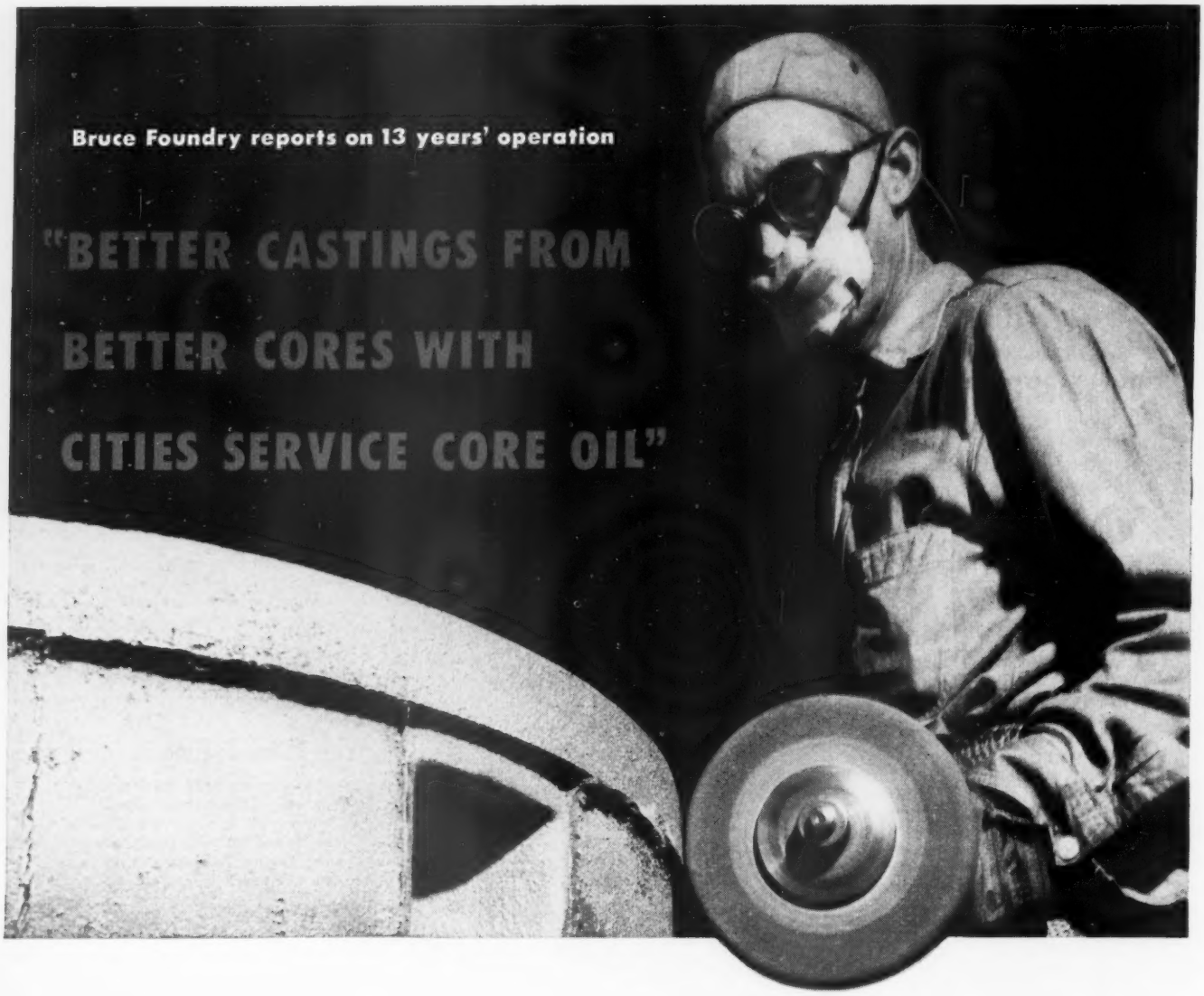
THE FANNER MANUFACTURING CO.

BROOKSIDE PARK CLEVELAND 9, OHIO

Designers and Manufacturers of Fine Fanner Chaplets and Chills

Bruce Foundry reports on 13 years' operation

"BETTER CASTINGS FROM BETTER CORES WITH CITIES SERVICE CORE OIL"



PRESIDENT WILLIAM J. BRUCE is high in praise for Cities Service Core Oil. Says it prevents premature collapsing, eliminates sticking, permits minimum smoke and offers absolute uniformity. Great in every respect.

Located in Tecumseh, Michigan, Bruce Foundry and Mfg. Co. has a melting capacity of 30 to 40 tons per day. For many years Bruce has turned out top-notch castings for refrigeration and automotive hydraulic equipment.

And for thirteen of those years, Cities Service Core Oil has been a major factor in the quality and rapidity of Bruce's work. Probably no one is better qualified to comment on this oil than President William J. Bruce. Here's what he says: "One of the biggest reasons I can think of for recommending Cities Service Core Oil is its absolute uniformity. This we have discovered in every single order for 13 years. As for foundry performance, I don't think there's a better oil. It has high hot strength preventing premature collapsing, yet collapses rapidly at the right time so that sand doesn't have to be dug out of castings. In addition, it eliminates sticking and permits minimum smoke."

If you'd like to learn more about the oil Mr. Bruce praises so highly, talk to a Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

AFTER REMOVAL FROM CORE BOX, sand core gets attention from skilled technician at Bruce Foundry. Firm makes castings for automotive and refrigeration hydraulic equipment, has used Cities Service Core Oil for 13 years.

cut, we then build our wind box.

The bottom of the wind box should circle the stack at a point about three times the tuyere opening height, measured from the bottom of the tuyere opening. In our case we have selected a tuyere height of 2 in., and this arrangement would put the bottom of the wind box 4 in. above the tuyere, or 6 in. above the bottom of the tuyeres. Wind boxes on the average run from 8 to 14 in. wide and from 3 to 4 ft high. The blast pipe should come in on a tangent, close to the top, between two tuyeres, and have a diameter the same as the outlet of the blower selected. In our case we will make the wind belt 8 in. wide, 3 ft high and 4 in. above the top of the tuyere openings. Naturally we box down from the wind belt to each of the tuyeres, making provisions for a tuyere peephole and opening device.

Provide Safety Tuyere

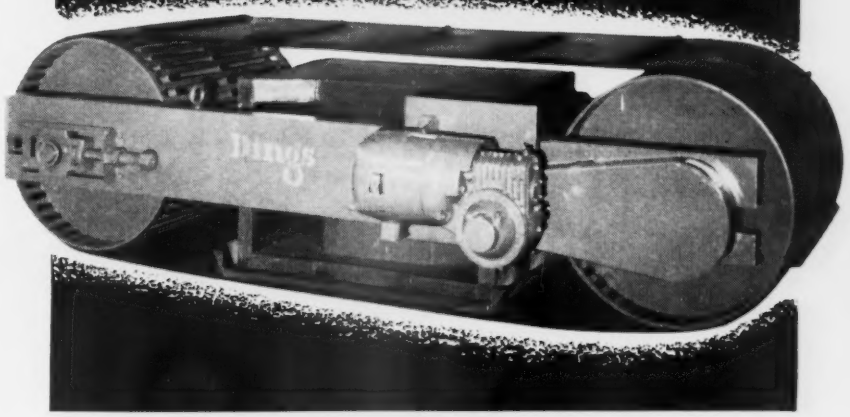
The box over the one tuyere which we set a shade lower than the rest should have a 2-in. hole in its bottom, covered with a sheet-lead disk. The device provides us with a safety tuyere. If the iron in the well should for any reason reach a height higher than the bottom of the tuyeres, it will spill over into the low tuyere, melt the lead disk in the bottom of this tuyere box and run out, causing no damage. We now have a stack ready to line. The lining is conventional. You should, however, step out the row of blocks directly above the tuyeres an inch or two to form a bosh.

Now we must select a suitable blower to provide the blast. For cupolas up to 18 in. in diameter, 6 to 8-oz pressure is sufficient. The general rule is to have at the blower 2.5 cfm for each square inch of cross-sectional area in the stack. Since we have 201 sq in. area x 2.5, the suggested blower selection is 502.5 cfm of air. It requires 30,000 cu ft of air to melt 1 ton of iron, and at 502.5 cfm we have 30,125 cu ft per hour available, or enough air to melt a little better than a ton. We expect to get 7 lb per sq in., or 1400 lb per hour, which would require about 21,000 cu ft of air delivered to the charge through the tuyeres.

Taking into consideration friction loss and leaks, we will have sufficient air with an 8 oz, 500-cfm blower. We hook our blower onto the wind belt with as direct a straight connection as possible, making all joints as leakproof as possible, and provide a blast gate to regulate the air. We also provide the wind belt with a suitable blast gage.

Our coke size should be from 1/10th to 1/12th the cupola diameter,

Here's Positive Self-Cleaning
TRAMP IRON PROTECTION



THE DINGS *IN-LINE*
RECTANGULAR MAGNET

● DINGS *IN-LINE* RECTANGULAR SELF-CLEANING MAGNETS pull tramp iron of any shape out of belt or oscillating conveyor burdens traveling at any speed. They do the job where even the largest diameter magnetic pulley would fail—where burden trajectories are almost horizontal.

● Iron extraction with the Dings IN-LINE is parallel to burden travel and at the same speed. That's why this magnet can handle tramp iron such as long iron rods with ease.

● The IN-LINE is a self-cleaning version of the Dings RM rectangular magnet—the most efficient ever designed for removing tramp iron from conveyor belt burdens. Available in standard sizes to meet almost any belt speed, width or burden characteristic requirements.

Dings

DINGS MAGNETIC SEPARATOR COMPANY
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Milwaukee 46, Wisconsin

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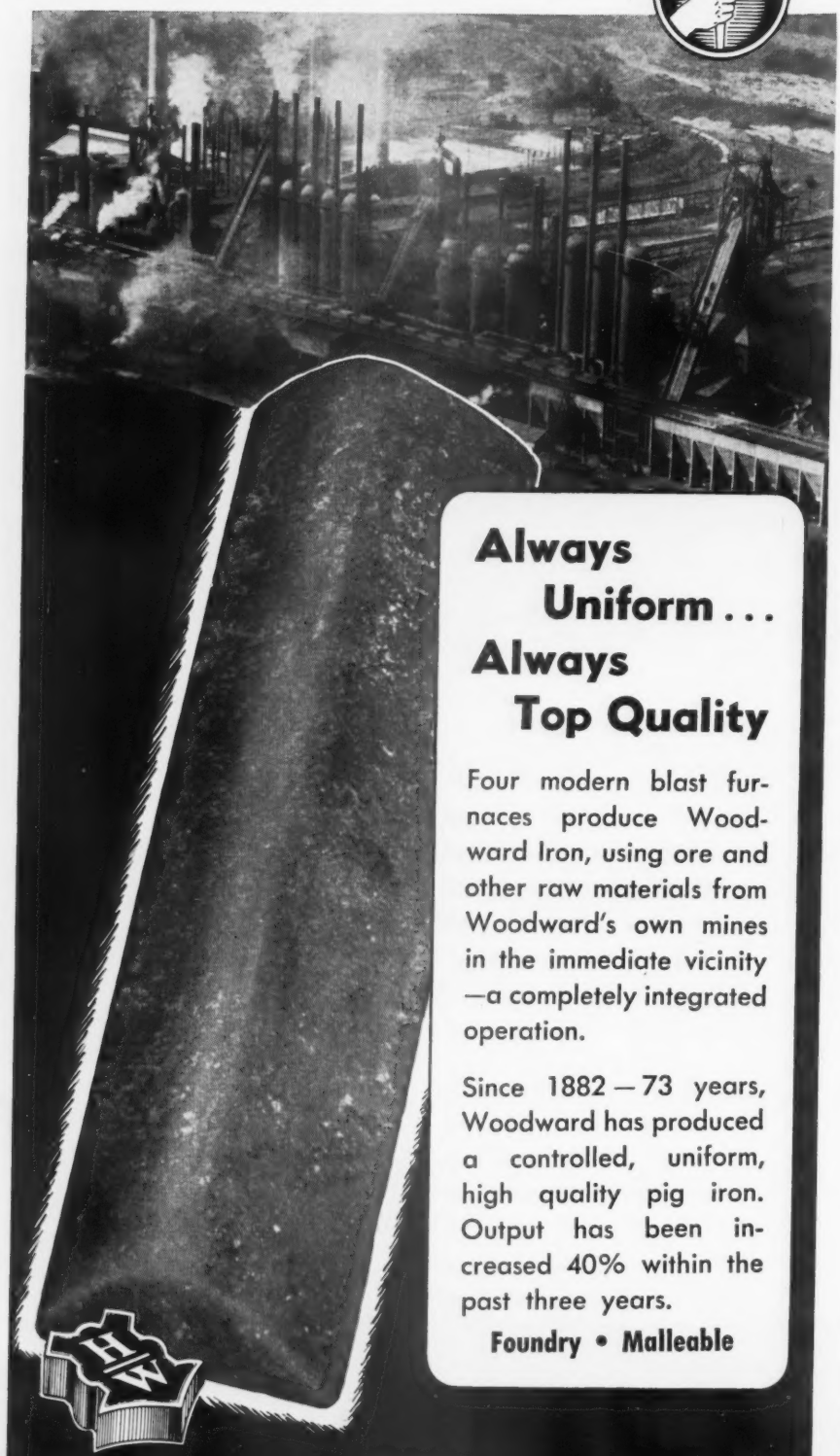
WOODWARD PIG IRON



Always Uniform . . . Always Top Quality

Four modern blast furnaces produce Woodward Iron, using ore and other raw materials from Woodward's own mines in the immediate vicinity —a completely integrated operation.

Since 1882 — 73 years, Woodward has produced a controlled, uniform, high quality pig iron. Output has been increased 40% within the past three years.

Foundry • Malleable

Hickman, Williams & Co.

(INCORPORATED)

CHICAGO • DETROIT • CINCINNATI • ST. LOUIS • NEW YORK
CLEVELAND • PHILADELPHIA • PITTSBURGH • INDIANAPOLIS

Established 1890

or, for 1/12th, no larger than 1¼ to 2 in.

Bed height equals about the square root of blast pressure × 10.5 + 6. If we have a pressure of 6 oz, the bed height should be the square root of 6 × 10.5 + 6, or 31.7 in. This is the height above the tuyeres; the actual operating height will have to be established by operational results.

The approximate metal charge at a ratio of 8 to 1 is equal to the area divided by 1.5 — in our case about 130 lb of iron and 16 lb coke. At a 6-to-1 ratio we would use 97 lb of iron; at 10 to 1, 160 lb; and at 12 to 1, 195 lb. The most common melting ratio is 8 to 1.

Limestone required runs about 35 to 45 lb per ton of charge. In our case, melting at a ratio of 1 to 8, using 35 lb per ton, we would need 2¼ lb per 130 lb of iron. Using 45 lb per ton, we would require 2.9 lb per 130 lb of iron.

Figure Capacity of Well

The formula for the capacity of the cupola well in iron looks like this:

$$\frac{\pi R^2 H}{2} \times 0.26$$

Here, π equals 3.1416, R equals radius, H equals distance from sand bottom to slag hole, and 0.26 equals approximate weight of 1 cu in. of iron, in pounds.

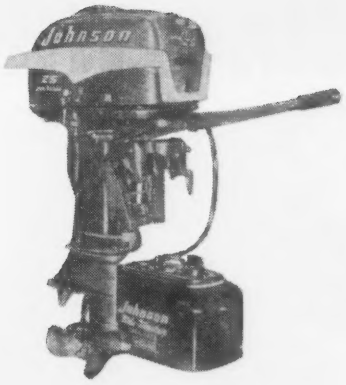
Running this up on the slipstick, we come up with about 150 lb of iron as the well capacity.

The rest is a matter of practice. Be sure the bottom-door prop is tight and rests on a firm footing. The bottom sand must be free from metal and must be put in properly. Do a good job of lighting the bed coke and burning it through, and establish and maintain bed height. Carefully weigh up both coke and iron charges. Keep the cupola record in good shape, take your time and don't rush the process.

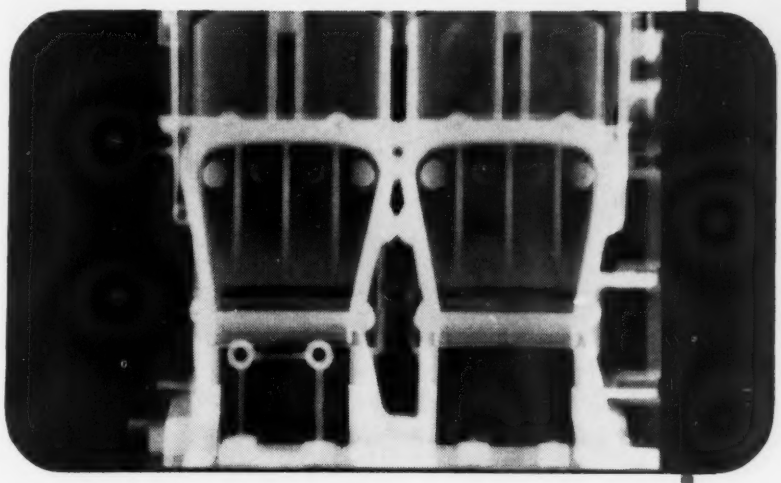
As you can see, the data given here are applicable to whatever diameter you might choose. These figures are approximate and are used as base from which to work. No two stacks seem to work alike. The best conditions of operation are established only by taking enough heats to establish some fixed values. In working up the dimensions of the 16-in. ID cupola described here, I have used a slide rule, so allow for some error. The dimensions are not critical, however.

Probably one of the most famous of the small, homebrew cupolas is the one at the Lee Hobby Foundry. Ralph Lee described his unit on p. 178 of FOUNDRY for September, 1954.

Sincerely,
CHARLIE



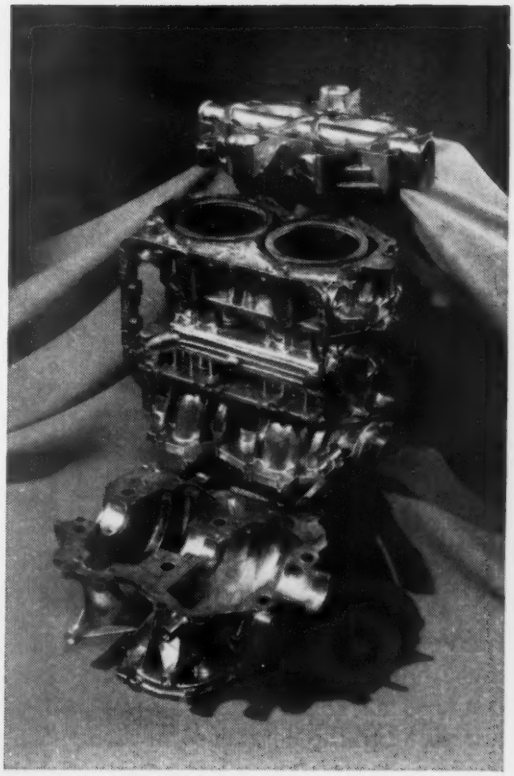
Dependability is a must . . . so



RADIOGRAPHY keeps its eye on production

Radiography . . .

another important example of Photography at Work.



SALES of outboard motors have gone up dramatically. New high power, smoothness, and quiet have all helped. But chief of their outstanding virtues is dependability.

This quality is guarded by radiography. It insures soundness of castings—sees that weakness is not lurking in a hidden flaw.

Radiography cuts cost, too, when x-rays reveal unsatisfactory castings before machining is begun.

Today radiography is playing a greater and greater role in good foundry operations. It frequently points the way to better casting methods . . . makes sure only sound castings are delivered.

If you'd like to know how radiography can help you, get in touch with your x-ray dealer. Or, if you like, write us for a free copy of "Radiography as a Foundry Tool."

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EASTMAN KODAK COMPANY, X-ray Division, Rochester 4, N.Y.

HOW TO BUY SNAGGING WHEELS

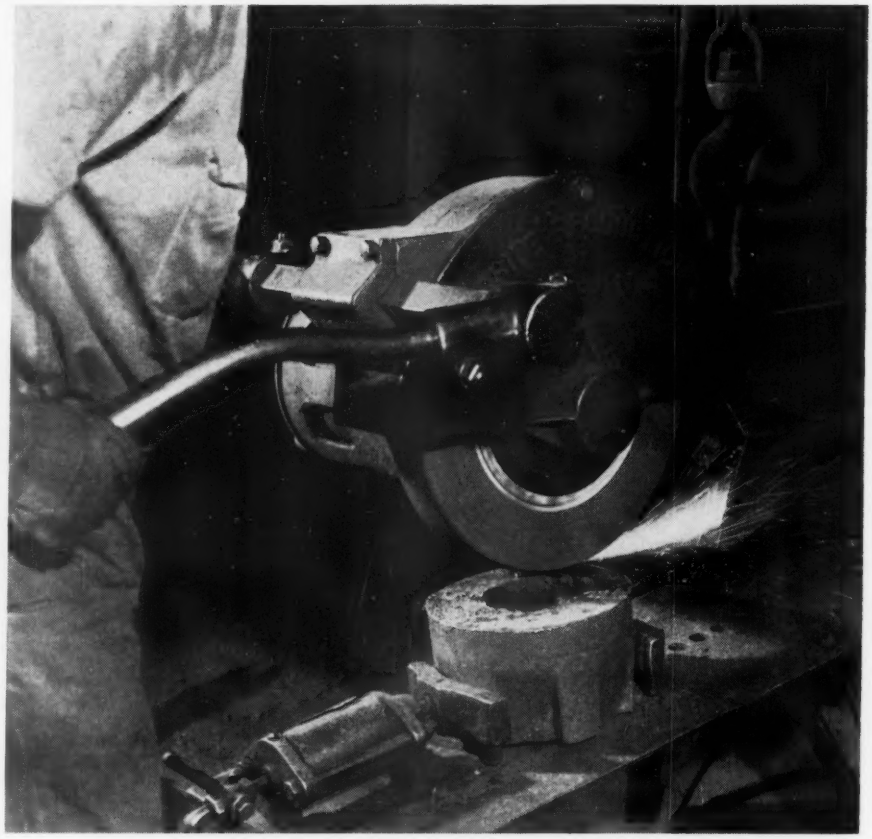
FOR FASTER CUTTING AND GREATER WHEEL ECONOMY

"More Use per Dollar"

Look for a wheel engineered for *your specific* castings and grinding conditions . . . to remove *more* metal, *faster* at *lower* cost.

For efficient snagging operations with stand grinders and swing frame grinders, careful attention must be given to the hardness, composition, size and type of abrasive and the bond used in the snagging wheel you select. They must be considered in relation to the type of metal being ground. To give maximum cutting action, the wheel should be properly bonded to allow free cutting at high speed . . . and to assure long wheel life. Specifications of the best snagging wheel for *your* operations can be determined only after a careful analysis of your particular needs. The manufacturer should be set up for quality control to assure uniformity in structure and composition to obtain duplication of high performance with each shipment.

Specify, by name, the snagging wheels custom-tailored to meet your operating requirements . . . specify Manhattan Snagging Wheels.



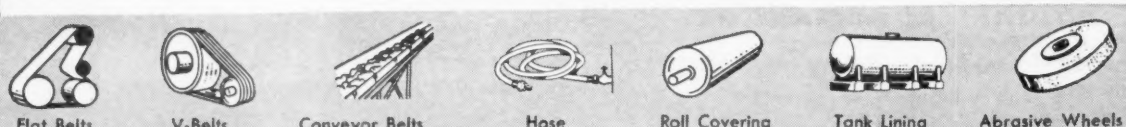
MANHATTAN SNAGGING WHEELS

Manhattan abrasive wheel engineers custom-tailor the *right* snagging wheel for *your* job. Type of abrasive, grain size, hardness, structure and bond are formulated according to the precise wheel your castings require. Tests have proved that Manhattan Snagging Wheels remove more metal faster at lower cost . . . and they last longer. Laboratory and manufacturing controls assure continuation of the original engineered performance of Manhattan Snagging Wheels to protect you on reorders. You get uniform quality, long trouble-free service . . . "More Use per Dollar" . . . with *every* wheel you buy. Let a Manhattan representative show you the advantages of custom-engineered Manhattan Snagging Wheels, and other types of high speed, heavy duty wheels. RM-529

WRITE TO ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



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Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Bowling Balls

Industry BRIEFS

MACKINTOSH - HEMPHILL CO. stockholders have approved sale of the firm's assets to E. W. Bliss Co., Canton, O., for an undisclosed price. Mackintosh, a Pittsburgh manufacturer of cast alloy steel and iron rolls, will be operated as a division of Bliss, which operates seven plants in the U. S. and two in Europe. It makes metalworking presses and supplies rolling mill equipment.

Fairbanks, Morse & Co. has opened a new sales and service headquarters for a seven-state area at 19-01 Route 208, Fair Lawn, N. J., in Fair Lawn Industrial Park. States in the area include Connecticut, New York, New Jersey, eastern Pennsylvania, Maryland, Delaware and Virginia. The company's Export Division sales offices also are located in the new headquarters building, a 50,000-sq-ft structure on a 5½-acre plot.

Chicago Malleable Castings Co., Chicago, suffered damage estimated at over $200,000 on Apr. 30 when fire hit part of the foundry and the machining department. No molding equipment was damaged, however, and the foundry returned to normal operation on May 5. The machining department was expected to need two weeks beyond that date to get back in service.

Silica Sand Corp. has been organized, with office headquarters in Henderson, Minn., to process and market silica sand discovered under 160 acres of land near Ottawa, Minn. The corporation has completed a half-million dollar plant and is equipped to produce over 30 carloads daily. Sand in the deposit is expected to last 100 years at the anticipated capacity.

Norton Co., Worcester, Mass., will open next Jan. 1 a new plant for manufacture of grinding wheels at 2555 Lafayette St., Santa Clara, Calif. Containing 50,000 sq ft of factory and office space, the plant will cost approximately $1 million. George A. Garrison, formerly superintendent of packing and shipping at Worcester, will be manager.

Hewitt-Robins Inc., Stamford, Conn., has established a subsidiary company in Holland to be known as Hewitt-Robins (Netherlands) N. V., located at 57 Von-Delstraat, Amsterdam. Products will include conveyor belting and other industrial rubber items. Alfred Cutler, manager of Hewitt-Robins Internationale in France, has been named manager of the subsidiary. Edward P. Larsen, formerly Western manager of the Engineers Division, Chicago, will direct engineering activities.

Interlake Iron Corp., Cleveland, is spending $10 million for a new battery of coke ovens and auxiliary facilities at its Chicago plant. The new battery will include 50 ovens and will replace units built in 1912. Prime contracts for the construction work are being let to the Wilputte Coke Oven Division, Allied Chemical & Dye Corp., New York. Work is expected to be finished in the summer of 1956.

American Brake Shoe Co., New York, has purchased the rights to the Par air compressor manufactured by Lynch Corp., Defiance, O., for the last 20 years. Lynch also is turning over its service parts business on the line. Kellogg Division of American Brake Shoe will furnish service parts on Par compressors now in use. Brake Shoe does not expect to manufacture the Par line.

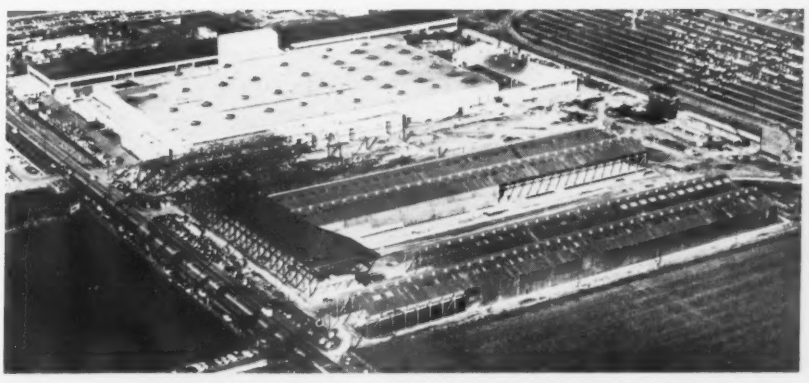
Pewaukee Foundry Co., Pewaukee, Wis., has been purchased by Perfect Casting Corp., a newly organized firm, for a price reported to be about $150,000. A small gray iron foundry, the Pewaukee plant has been idle for several years. Perfect Casting, which has started operations at the foundry, is headed by Carl R. Hunt, formerly a superintendent at Maynard Electric Steel Casting Co., Milwaukee. President of Pewaukee Foundry was Carl Moser Jr.

Willson Products Inc., Reading, Pa., manufacturer of industrial protective devices, has been purchased by Ray-O-Vac Co., Madison, Wis. J. Clyde Ryan, executive vice president, Ray-O-Vac Co., was elected president and general manager of Willson. He succeeds Thomas A. Willson, named board chairman. Dr. Frederick Willson, chairman since 1942, has retired. Thomas A. Willson Jr. was elected vice president in charge of production.

Continental Foundry & Machine Co., East Chicago, Ind., has purchased two buildings in Pittsburgh from West Penn Power Co. and will move its Pittsburgh activities to them next year. One building, at 14 Wood St., is a 14-story structure containing 57,750 sq ft, and the other, adjoining it, is 4 stories high and contains 15,725 sq ft.

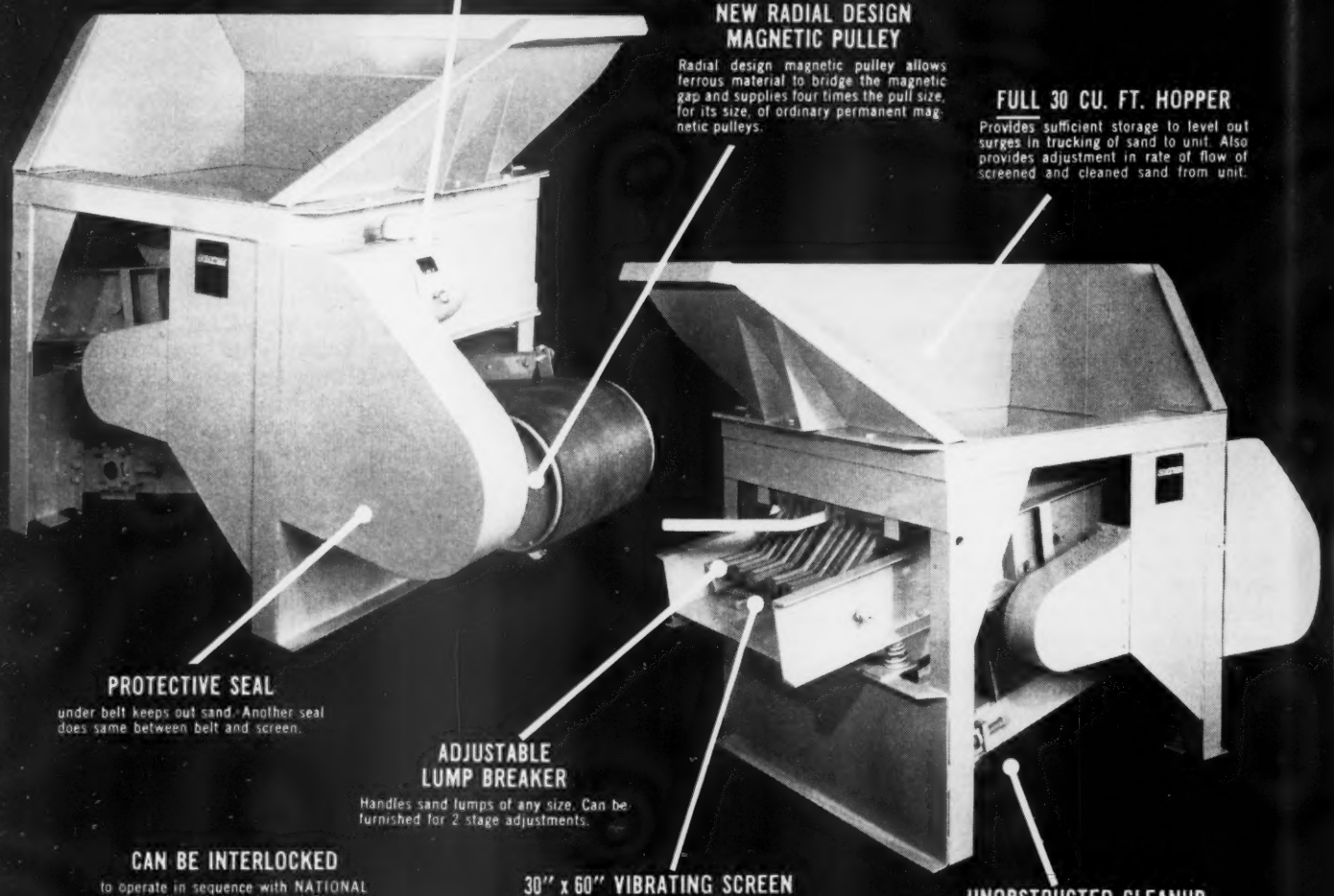
Durez Plastics & Chemicals Co., North Tonawanda, N. Y., has consolidated with Hooker Electrochemical Co., Niagara Falls, N. Y., and will be known as the Durez Plastics Division of Hooker.

Archer-Daniels-Midland Co., Minneapolis, has established a new products development department for evaluation of market potential for new products developed in its re-



HALF FINISHED: Building expansion of Harvey Aluminum, Torrance, Calif., has reached the half-way mark. The installation of additional foundry equipment for the aluminum division is included in the expansion program. Production from the new facilities is planned by the middle of the year

NATIONAL SCREEN



ONE MOTOR
Single motor powers both belt and screen. Delivers controlled vibration to every inch of screen.

NEW RADIAL DESIGN MAGNETIC PULLEY
Radial design magnetic pulley allows ferrous material to bridge the magnetic gap and supplies four times the pull size, for its size, of ordinary permanent magnetic pulleys.

FULL 30 CU. FT. HOPPER
Provides sufficient storage to level out surges in trucking of sand to unit. Also provides adjustment in rate of flow of screened and cleaned sand from unit.

PROTECTIVE SEAL
under belt keeps out sand. Another seal does same between belt and screen.

ADJUSTABLE LUMP BREAKER
Handles sand lumps of any size. Can be furnished for 2 stage adjustments.

CAN BE INTERLOCKED
to operate in sequence with NATIONAL straight lift bucket loader and Simpson Mix-Muller.

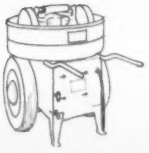
30" x 60" VIBRATING SCREEN
Heavy duty, eccentric located in center of screen. Screen mesh designed to suit your requirements—can be changed in less than 30 minutes.

UNOBSTRUCTED CLEANUP
Structural members arranged to permit cleanup and freeway of loaders or tote boxes.

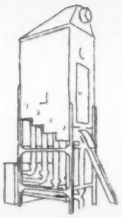
NO PITS REQUIRED! UNIT IS FLOOR MOUNTED!

. . . PRODUCTS OF THE PRACTICAL FOUNDRYMAN . . .

SIMPSON MIX-MULLERS
25 to 4000 lb. batch capacity

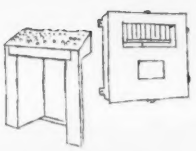


SIMPSON PORTO-MULLER
250 lb. capacity (100% portable)



NATIONAL SAND RECOVERY SYSTEM
Practical pneumatic sand scrubber

NATIONAL HYDRO-FILTER
Wet-type dust collector

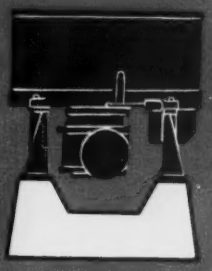


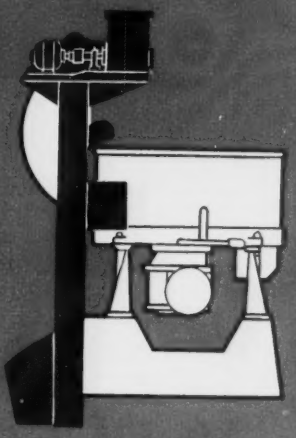
NATIONAL TIMEMASTER
Console and unit mounted
Automatic cycle controls.

MASTER*

*SCREEN AND CLEAN MOLDING SAND—FAST

add low cost mechanization to sand preparing operations





The National Screen Master is an essential, self-contained and flexible screening unit which requires no pits or foundations . . . and can be easily incorporated into your present sand conditioning operation. Added to your present Simpson Mix-Muller and Bucket Loader, SCREEN MASTER can assure low cost, yet high efficiency mechanization for even modest preparing plants. A heavy duty, adjustable lump breaker makes *usable* sand of molding lumps. A new, radial design, magnetic pulley assures *positive* elimination of tramp metal to protect machinery . . . reduce molding scrap.

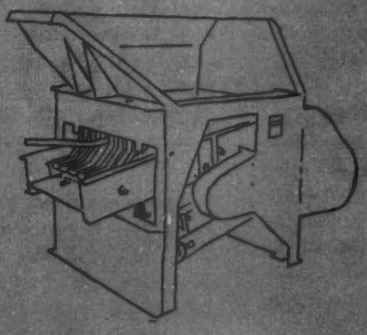
That's what the Screen Master will do . . . here's why it will do it *better:*

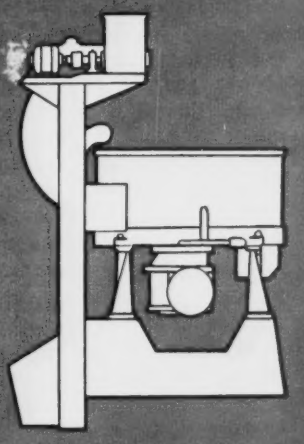
CONTROLLED VIBRATION Both the rate of feed from the hopper and intensity of vibration can be controlled by field adjustment to suit your requirements.

HEAVY DUTY 30" x 60" screen; *full, 30 cu. ft.* hopper and heavy duty construction assure dependable 50 ton per hour production.

CLEAN Screen Master provides a protective seal between belt and screen and below belt to keep sand out of moving parts. There are no obstructions at floor level either. Unit stays clean . . . and it's easy to keep clean.

EFFICIENT Simple design makes most efficient use of power. One motor drives both vibrating screen and belt.



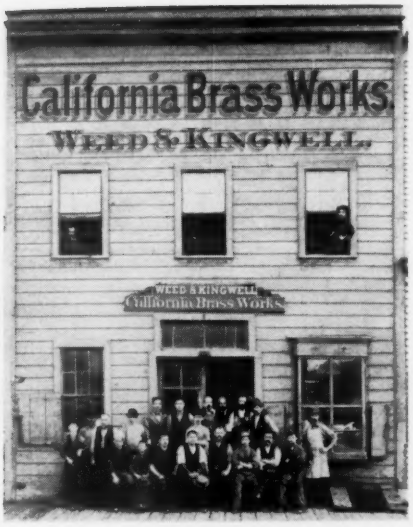


Look over the many other features of this new screening unit in the photos at left and remember that it is another NATIONAL product, made practical *by 40 years of know-how, foundry engineering and on-the-job experience. Write for details, today.*

SIMPSON *MIX-MULLER*® DIVISION

NATIONAL ENGINEERING CO., 646 Machinery Hall Bldg., Chicago 6, Ill.

(Not Inc.)



View above shows the exterior of the Kingwell Bros. plant on Minna St., San Francisco, as it looks today. At right: Weed & Kingwell's California Brass Works was founded in this building on Natoma St., near the new plant, in 1855

CALIFORNIA FOUNDRY

Marks 100th Anniversary

ONE hundred years ago, California Brass Works, or Weed & Kingwell, as the company also was known, was established in San Francisco, on Natoma St. The foundry turned out padlocks for Wells Fargo money boxes and fog bells for ships moving in and out of the Golden Gate. Bronze nozzles for the San Francisco fire department were another of its products.

Today, on Minna St., not far from the original location, Kingwell Bros. Ltd. is making castings which illustrate the changing patterns of American life during the last century. Now the company does a large business with the aircraft industry, providing special parts with bronze bases for airplane components. In addition, heavy machinery manufacturers in the West take a large portion of Kingwell's output. Bronze bushings and bearings make up most of this work.

Kingwell today is said to be the largest foundry of its kind in the West. It has more than 100 employees. Officials are: President, Jack Nauman; sales manager, Jack Starks; plant superintendent, Joseph Spediacci; treasurer, Sidney Rudd.

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search laboratories and widening of activities. Dr. George K. Nelson, for the past 2 years assistant manager of the product development department, Chemical Division, Celanese Corp. of America, New York, is director of the new department.

Morris Bean & Co. has set up separate sales organizations for aluminum and ductile iron operations. Douglas E. Scott has been named sales manager of its aluminum foundry, located in Yellow Springs, O. Edmund C. Turner has been appointed sales manager for the ductile iron foundry in Cedarville, O.

Valley Pipe & Foundry Co., Erie St., Mount Morris, N. Y., has been granted a charter of incorporation listing capital stock at 40,000 shares of no par value. Directors are Thomas Boyd, R. F. D., Geneseo, N. Y.; Ben and Mary Gissin, 12 Maplehurst Rd., Rochester, N. Y.

Union Carbide & Carbon Corp., New York, is building new research laboratories on a 66-acre plot in Parma, O., a Cleveland suburb. They will be managed by National Carbon Co., a division of the corporation. The laboratories will engage in basic, exploratory work. Activities will be directed toward specific end-products only to the extent that they have their primary origins in the discovery of new and fundamental material-process applications.

American Steel Foundries Inc., Chicago, has for the second consecutive year, made a $1000 grant to Illinois Institute of Technology to foster foundry education at the school. The presentation was made to the institution's metallurgical engineering department through the Foundry Educational Foundation, Cleveland.

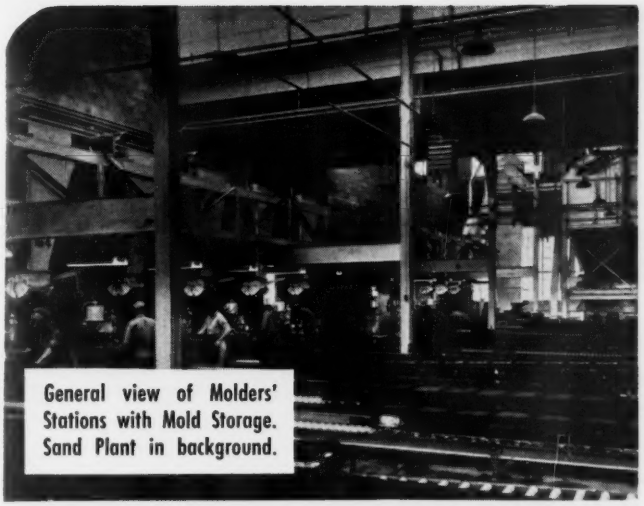
Charles L. Jarvis Co., Middletown, Conn., manufacturer of power tools, has changed its name to Jarvis Corp.

United Engineering & Foundry Co., Pittsburgh, has been authorized by stockholders to increase its indebtedness to $15 million. The funds will be used in part to finance a modernization and improvement program involving an expenditure of about $9 million over the next two years. All of the company's plants will participate in the improvement.

Machinery Associates Inc., Wynnewood, Pa., has been appointed exclusive representative in Washington, D. C., for Grinding Machine Division, Norton Co., Worcester, Mass. Machinery Associates Inc. will continue to represent Norton in the Philadelphia area.

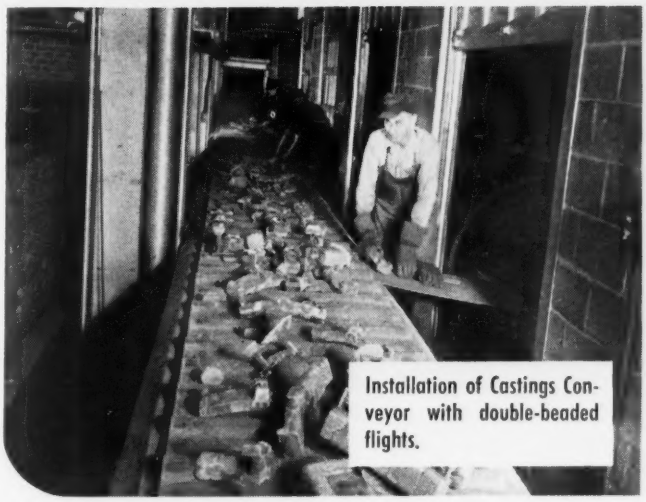
Carboloy Department of General Electric Co., Detroit 32, has appointed McKee Tool & Supply Co., 925 North Jameson Ave., Lima, O., as distributor of its line of carbide metal cutting tools and diamond grinding wheel dressers.

Industrial Crane & Hoist Corp., Chicago, has appointed Lewis W. Bentley new manager of the Detroit office located at 18431 James Couzens Highway, Detroit 35.



General view of Molders' Stations with Mold Storage. Sand Plant in background.

Modernization... steps up production and profits



Installation of Castings Conveyor with double-beaded flights.

Pouring and Shakeout end of Mold Storage Lines. Sand is collected on Belt Conveyor in tunnel and returned to Sand Plant.

When You Mechanize, Do it the Jeffrey Way!

Lost orders and lost profits are the high costs of foundry equipment obsolescence. Jeffrey foundry modernization programs can reduce labor hours per unit for you . . . lower your costs and rebuild your profit margin.

The Jeffrey *way* of mechanization is a complete service, including sand handling, reclaiming, mixing, preparing and distributing systems . . . flask filling equipment . . . mold, casting, flask, coke, pig iron, scrap and limestone handling equipment . . . conveyors for continuous sand blasting and core drying . . . reduction machinery for cores and other foundry materials.

Write for Catalog No. 845.

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

. . .IT'S A JOB FOR JEFFREY!

Operator of the picturesque foundry is Peter Caird, for whom the plant fulfills an ambition of long standing. He is shown before a pattern rack, examining patterns

Unusual Setting Selected for

WESTERN NONFERROUS FOUNDRY

By DEWAR FORBES

ONE of the most unusual foundries in America is a few miles east of the business district of Santa Rosa, Calif. Santa Rosa is about 55 miles north of San Francisco. The Santa Rosa Brass, Bronze & Aluminum Foundry occupies a beautiful site of 10 acres, surrounded by well-kept lawns and gardens. It lies on the edge of the Valley of the Moon, or what is known locally as Jack London country. The owners, Mr. and Mrs. Peter Caird, have their home right on the foundry grounds.

Mr. Caird is a foundryman thoroughly trained in design, patternmaking and molding. He served his apprenticeship as a patternmaker in Scotland and worked as a journeyman at marine work in the shipyards on the Clyde River.

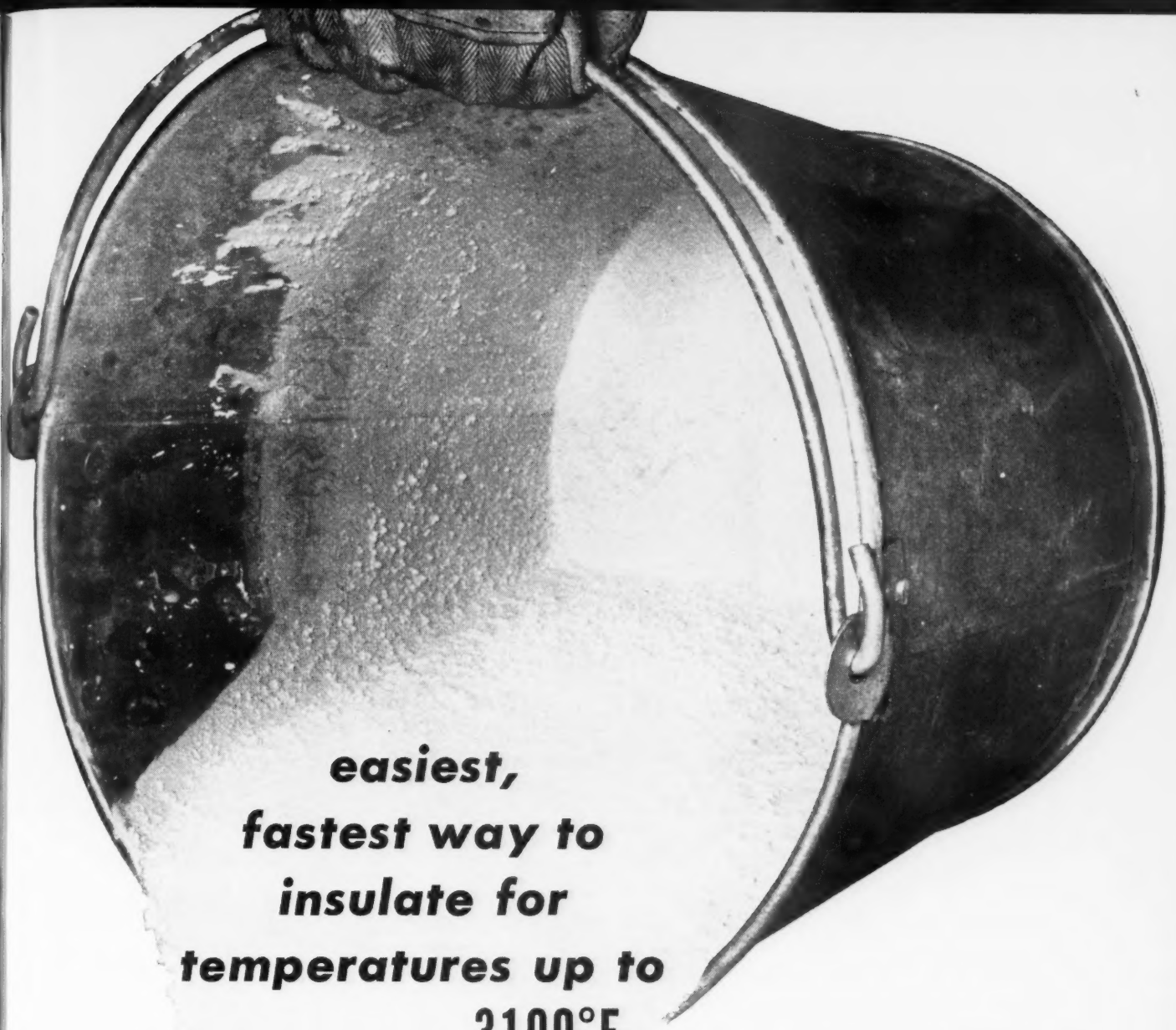
On coming to America he was associated with the Ford Motor Co., at a time when Henry Ford spent a lot of time in his foundries. Mr. Caird tells a great many interesting tales of his days at the Ford foundries. He was fond of trying out new ideas and suggesting methods of improving foundry production methods, and he always found Mr. Ford most co-operative.

More than 30 years ago he heard the call of the West, and headed for Oakland, Calif. The open spaces of California appealed strongly to Mr. Caird, who is a great lover of nature, and he determined that some day he would have a foundry of his own in some beautiful spot well away from the hustle and bustle of the metropolitan areas. He planned to have his foundry and his home on the same property, set in the midst of lawns and flower gardens. It took more than 20 years to fulfill this desire.

In the meantime, he opened a patternmaking job shop in Oakland and later added a foundry. Ten years ago he transferred his base of operations to its present site, near Santa Rosa. Here, although his foundry is within easy reach of town, it also is a drive of only a few minutes from

View shows interior of the foundry. One product is a nationally distributed line of fire nozzles

View of modern pattern shop reflects good housekeeping which characterizes the entire operation

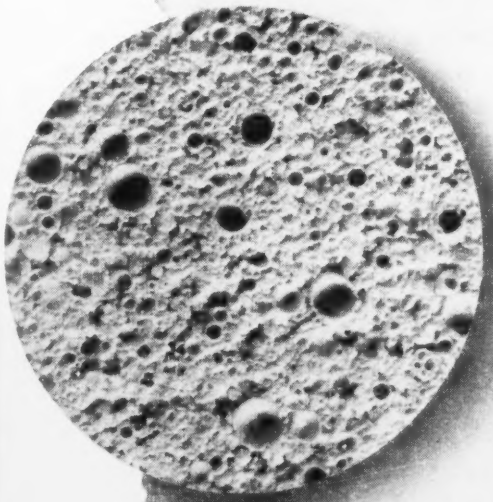


easiest, fastest way to insulate for temperatures up to 3100°F

ALFRAX® castable aluminum oxide cements are just about the most effective insulating materials you can find for temperatures up to 3100°F—and especially so at the upper end of the temperature range. They consist of tiny bubbles of pure alumina held together by a bonding agent.

These castables make ideal back-up linings for nonferrous crucible furnaces and for the sidewalls of reverberatory furnaces. Or you can cast them into burner blocks for core ovens and malleable annealing furnaces. Aluminum oxide is one of the most stable and inert of all materials . . . is highly resistant to practically all furnace conditions. And to use, all you do is mix it with water and pour.

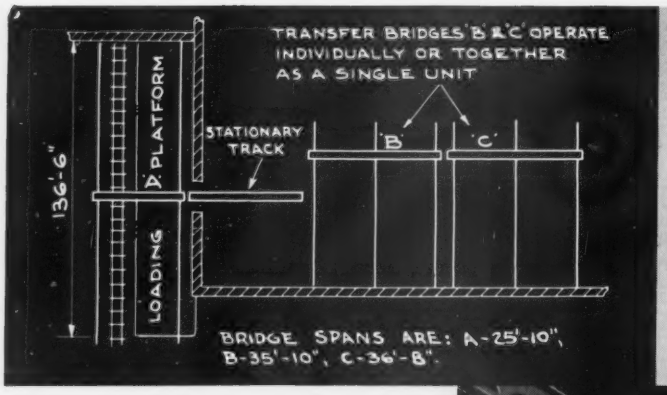
So, if you're looking for a castable insulating material to stand really high operating temperatures . . . and keep on standing them through a long, useful life . . . you can end your search right now by writing us for free engineering information on these highly refractory, low heat capacity, easy-to-use cements. Address Refractories Division, The Carborundum Company, Perth Amboy, N. J., Department A65.



Here's why ALFRAX cement insulates so well: A sliced-through section of set cement reveals the secret: dead air space in the thousands of closely-packed bubbles of alumina.

CARBORUNDUM

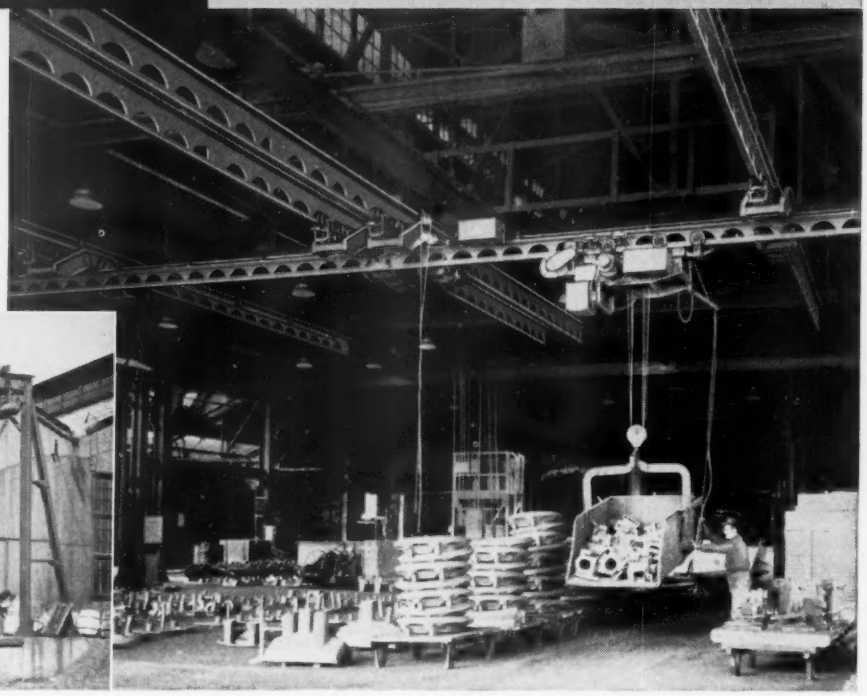
Registered Trade Mark

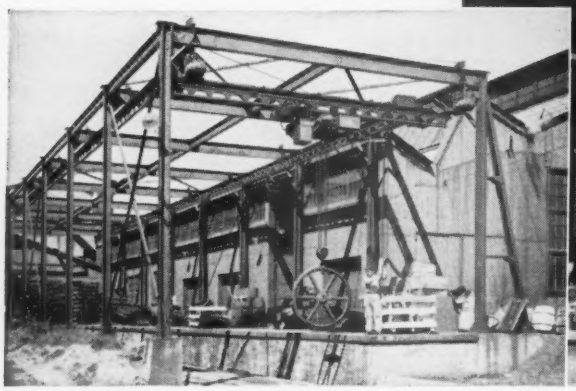


5 TON TRANSFER BRIDGE SYSTEM with Advanced Features

(At right) The two inside bridges are shown interlocked and being operated as a single unit. Either bridge may be operated individually. All control is centralized in the push button station suspended from the carrier.

(Below) The outside bridge serving the loading dock interlocks with inside track at doorway.





CASTINGS can be picked up at any point in the large shipping room, and loaded onto railroad cars or trucks at the outside of the building with this efficient 5-ton transfer bridge system. The bridges and stationary track interlock, enabling the motor-driven carrier to operate on any bridge.

The two inside bridges can be operated individually or together as a single unit, and controlled completely by means of the pendant push-button station on the carrier. This permits operating the bridges separately for local work in the bays each covers. When transporting materials from one bay to the other, time is saved by operating the bridges interlocked as a single unit because then it is not necessary to travel the bridges extra distances in order to interlock them for transfer of a carrier.

There is no end to the ways in which Cleveland Tramrail equipment can be adapted to serve industry's needs. What is your problem?

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3801 EAST 284th STREET, WICKLIFFE, OHIO

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

good ocean, lake or river fishing, with deer hunting and quail and pheasant shooting right outside the back gate of his property. Deer actually have come down from the hills and wandered into the foundry grounds.

Mr. Caird's foundry produces a large variety of industrial castings, including a line of fire nozzles distributed all over the United States and Canada. Also a special line of art castings is made, such as the bust of Jack London which was recently placed in Jack London Square, in Oakland. This bust was unveiled a few months ago by the late writer's daughter, Mrs. Fleming. Besides the foundry proper, modern pattern and machine shops are in operation. Mr. Caird does his own designing and his own bas and low-relief work.

The Caird residence is a comfortable country style house set among green lawns and flower gardens on a portion of the foundry grounds. Mr. Caird believes that country life is a good life. He says that having his home where he works gives him a chance to rest and relax at noon or whenever the opportunity arises and is conducive to good health and peace of mind.

Mr. Caird is ably assisted in the foundry operation by his wife, Clara, who, like him, has a very entertaining touch of humor. Mr. Caird always has time to meet visitors and show them the foundry and the scenic site on which it is located.

Schools and Government Offer Management Help

This year 22 educational institutions are co-operating with the Small Business Administration in sponsoring administrative management courses for owners and managers of small businesses. The courses are conducted entirely by the educational institutions and are designed to provide current, helpful information on administrative management. A leaflet containing additional information about the courses is available on request from Small Business Administration Regional Offices.

Dutch Directory Is Issued

The Association of Metal-Working Industries (Vereniging van Metaal-Inustrieen) 13 Nassaulaan, the Hague, the Netherlands, has issued a 756-page book entitled *Metal Products from Holland*. Divided into sections it provides in both Dutch and English names of the member firms, their addresses and the products manufactured. It also lists representatives in foreign countries. A product register in Dutch includes names of the makers. Alphabetical indexes in Dutch and English make it easy to locate specific products and their manufacturers.

Book Review

Transactions of the American Foundrymen's Society, Vol. 62, 1954, cloth, 680 pages, 8 x 11 in., published by the American Foundrymen's Society, Golf and Wolf Roads, Des Plaines, Ill. Price, $15.

Containing nearly 100 papers and discussions presented at the annual meeting of the society, this volume also includes the president's address, minutes of the directors' meetings, as well as reports of various officers. The annual Charles Edgar Hoyt lecture on "Processing of Molding Sand" by Harry W. Dietert occupies 32 pages of the book. Papers presented cover a wide range of topics relating to castings and their production. Subjects range from operating practice to research developments in metallurgy, heat transfer and other fields.

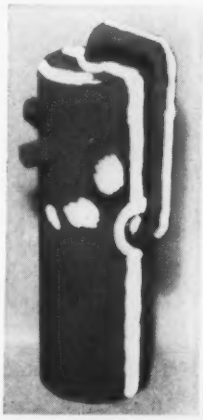
It's Clean!
It's Efficient!
and
LOW IN COST!

MABCO
WHITE CORE DAUB

Your core makers may not work in evening clothes, but you'll be surprised how fast efficiency jumps when they can mud cores without soiling hands and clothing.

This new WHITE Core daub will prove its worth many times over.

See what these features mean to you —



- *Easy to apply — will air dry readily*
- *Molten metal lays kindly to MABCO Core Daub— even when wet.*
- *Excellent for mudding green topped cores*
- *Outstanding for dough rolls*
- *Exceptionally smooth finish — Will not chip off when oven or torch dried.*

Can also be furnished in non-staining silver color containing Plumbago.

Write for trial order today!

M. A. BELL COMPANY
217 Lombard St. · St. Louis, Mo.
"Serving the foundry industry for over 25 years"
HOUSTON DENVER

Modern Foundry Installs

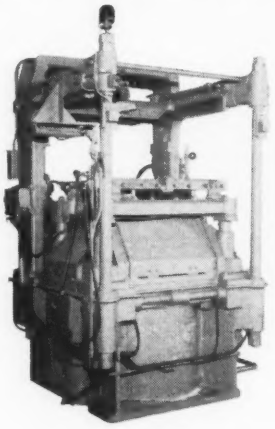
OSBORN

Jolt Squeeze Strippers

. . . attains high production of accurate automotive molds at low cost

BASED on 30 years' experience using Osborn molding machines, this manufacturer again selects Osborn for its new, modern foundry.

A line of No. 1236 Osborn Jolt Squeeze Strippers mechanically handles the operations of turning out quality molds for engine blocks at a high rate of production. Molds are accurate in size, uniform in density and low in cost.



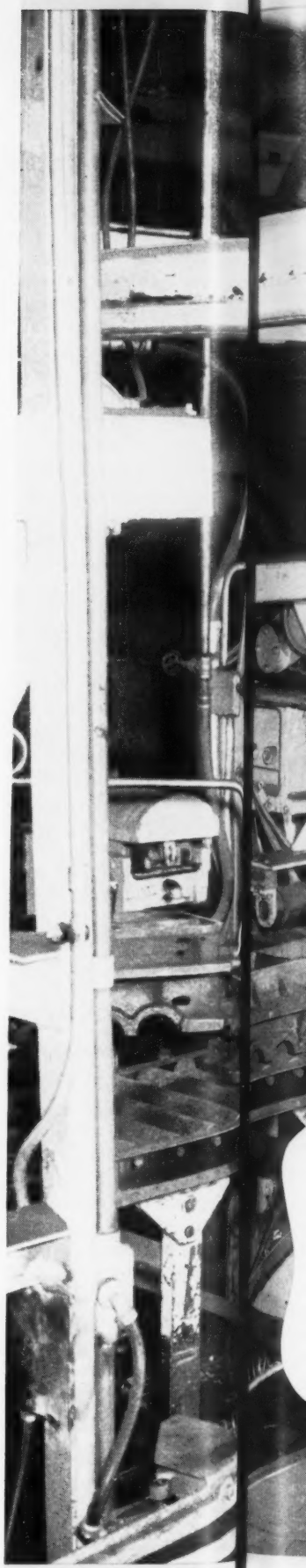
Why not have an Osborn specialist study your operations to learn where foundry modernization can save you money? The Osborn specialist will also show you how to improve the quality of your mold production to reduce costly scrap. Call or write

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue • Cleveland 14, Ohio

OSBORN

MOLDING MACHINES CORE BLOWERS
INDUSTRIAL BRUSHES

Another example of Osborn leadership and advanced engineering



Modernization pays off again!
Flasks come down one conveyor to Osborn No. 1236 Jolt Squeeze Strippers . . . Finished molds go down another conveyor to the pouring line with minimum handling.

Foundry Developments

By EDWIN BREMER
Metallurgical Editor

POROSITY in phosphor-bronze castings can be reduced by applying a special coating to green or baked sand molds, according to a British report. It is described in an article, "Relationship Between Pouring Temperature and Tensile Strength of Sand-cast Bronze," by W. T. Pell-Walpole in the Mar. 31 issue of *Foundry Trade Journal* (London).

The coating, containing 10 per cent Al_2O_3 and 10 per cent graphite in a tar-oil carrier, is said to result in a three-fold action: It evolves carbonaceous gases which bubble through the molten metal, exerting a scavenging action and removing some of the hydrogen present. It protects the metal from the harmful effects of steam generated from free moisture in the mold. It extends the safe range of pouring temperatures for high-phosphorus bronze from about 2020° F to 2100° F by preventing the molten metal from reacting with the combined moisture of the sand mold.

Resists Corrosion

CORROSION-resistant alloy cast iron as described in U. S. Patent No. 2,699,992 contains about 3.2 per cent C, about 0.60 per cent Cr, about 1.30 per cent Ni, about 0.45 per cent Cu, around 0.48 per cent Mo, from 1.25 to 5.6 per cent Si, from 0.20 to 3.0 per cent Mn, 0.03 to 1.00 per cent S, 0.02 to 2.00 per cent P, 0.05 to 1.00 per cent Al, and remainder Fe.

Withstands the Heat

RECENT development of the Aluminum Co. of America is an alloy, presently designated X2219, which is reported to have exceptionally good mechanical properties, tensile and yield strength, and resistance to creep at elevated temperatures in the range 500 to 600° F in the heat treated and aged condition. The alloy is a member of the aluminum-copper group with small additions of several other elements. Minimum room temperature properties are indicated as 55,000 psi tensile strength, 35,000 psi yield strength and 6 per cent elongation in 4D. Tensile strength 1000 hr at 500° F showed 29,000 psi, with yield strength of 21,000 psi and 24 per cent elongation in 4D. At 1000 hr at 600° F the tensile strength was 18,000 psi, the yield strength 14,000 psi and elongation 26 per cent. Stress for 0.2 per cent total creep in 100 hr at 600° F was 6700 psi.

Has New Application

CHLOROPHYLL, according to British reports, has been found effective in preventing tarnish on silver and copper and their alloys. Tissue impregnated with the material will be available before long for wrapping articles made with those metals or for placing in closed cabinets containing them. Chlorophyll has the ability to absorb hydrogen sulphide, which causes tarnish.

Keeps Metal Fenced in

ZONE refining, whereby a bar of metal is melted progressively from one end to the other to refine it, is being applied to purify titanium at Westinghouse Research Laboratories. In the process a bar of titanium is stood on end on a movable platform in a bell jar under a low-pressure, inert atmosphere of argon or helium. Bar of metal is slowly moved upward through a high-frequency induction heating coil which causes the bar to melt from the inside. The corners of the bar, less affected by the induced electric currents, rapidly lose what heat they possess to the surrounding atmosphere and remain rigid, acting as a cage to confine the molten metal. Impurities such as iron follow the molten metal and finally concentrate at the lower end of the bar which is cut off.

Must Control Hydrogen

"EFFECT of Hydrogen on the Mechanical Properties of Titanium and Titanium Alloys" is the title of a recently published report, PB 111568, available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, for $2.25. Prepared by Battelle Memorial Institute, the report indicates that hydrogen must be kept under close control because it has no beneficial effects. Materials studied included high-purity and commercial-purity titanium, alpha titanium alloys of the Ti-N and Ti-Al types, two commercial alpha-beta alloys and high-purity titanium-manganese alloys.

Radiographs Available

AFTER some four years of effort by hard-working industry members of ASTM Committee E-7 on Non-Destructive Testing, reference radiographs covering types and degrees of discontinuities in steel welds are available. They include 35 radiographs in the form of transparencies mounted in standard 5 x 8-in. Keysort cards. Details of plate thickness, radiographic method, and welding procedures are given on each card. No attempt has been made to establish limits of acceptability for any discontinuity. For identification purposes each type of discontinuity is designated by a number. Degree of severity for each defect is indicated by a letter.

Simplifies Core Work

IMPORTANT part of the engineering history of the new Pontiac V-8 engine is the simplification of the casting of the cylinder block and cylinder heads. Early experimental cylinder block cast in the conventional manner required 18 cores while present production engines need only 8 cores. Similarly, the number of cores for cylinder heads has been reduced from eight to four. In both cases separate core assemblies requiring pasting and nailing virtually have been eliminated, removing the possibility of fins occurring in undesired places.

Protecting Magnesium

COATINGS on magnesium alloys obtained by a low-voltage alkaline chromate process protect against salt-spray corrosion as well as coatings from other anodizing processes now used. This is indicated from an investigation by H. I. Slamon, M. L. Kronenberg and F. Ogburn of National Bureau of Standards' electrodeposition laboratories under sponsorship of the Army. The process operates at 10 to 12 volts ac, and the electrolytic bath is composed of sodium or potassium hydroxide, the corresponding chromate and water. A current of 80 to 140 amp per sq ft passed through the bath 20 to 40 minutes deposits a coating 0.001 to 0.002-in. thick. The coating is smooth and gray-green in color.

BASIC NEWS
FOR CUPOLA OPERATORS

Basic Refractories offers field service to foundries

Cupola operators interested in adopting a basic practice can get information and help from Basic Refractories' engineers. These men know refractory application and are familiar with cupola practice.

BASIC SLAG SYSTEMS REDUCE SULPHUR CONTENT OF IRON 50%

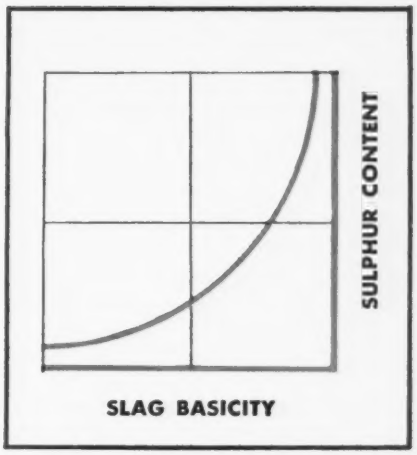
Where low sulphur is desirable in producing special irons, like ductile, basic slag systems save money because of their ability to absorb sulphur from the metal and coke charge. Cupolas operating basic can produce iron with a sulphur content approximately one-half of that produced in an acid cupola. Basic slags also bring about conditions that increase the tendency of iron to absorb carbon.

The following table indicates approximately the sulphur contents that can be expected with slags of various basicities.

SLAG BASICITY	SULPHUR CONTENT
0.8 or lower	.08% or higher
0.8 to 1.3	.08% to .04%
1.3 or higher	.04% or lower

Within limits, the higher the basicity ratio of the slag, the better its desulphurizing properties. Basic slags have lime available to react with sulphur contained in the charge. The sulphide formed is many times more soluble in the slag than in the iron.

Operations employing basic slags are only possible when a basic lining is used.



Basic linings for cupolas offer 8 advantages

Costs of basic linings and maintenance refractories are higher than those of acid materials. But these costs are offset by the following advantages:

1. **Lower sulphur content in the iron produced**
2. **Greater carbon pickup**
3. **Higher metal tap temperatures**
4. **Use of lower cost charges**
5. **Absence of bridging and clean drop**
6. **Better pouring characteristics of metal**
7. **Less scrap castings**
8. **Steel scrap can be substituted for low-phosphorous pig iron without lowering the total carbon content of the iron.**

HOW TO CALCULATE DEGREE OF SLAG BASICITY

Cupola Charge:

Steel scrap		3800 pounds
Pig iron		600 pounds
Ferrosilicon		200 pounds
Total metal		4600 pounds
Limestone		300 pounds
Coke		800 pounds

Silicon (Si) Charged:

Steel scrap	(.45% Si)	3800 × .0045 = 17.1 pounds
Pig iron	(1.00% Si)	600 × .0100 = 6.0 pounds
Ferrosilicon	(50% Si)	200 × .5000 = 100.0 pounds
Total silicon charge in metal		123.1 pounds

Silicon (Si) Tapped in Metal:

Metal (1.3% Si) . . . . . 4600 × .0130 = 59.8 pounds

123.1 − 59.8 = 63.3 pounds silicon (Si) lost to slag. When silicon (Si) is oxidized to silica (SiO_2), 28 pounds of Si will produce 60 pounds SiO_2, therefore:

63.3 × (60 ÷ 28) = 135.6 pounds SiO_2 to slag.

Silica from Coke:

800 pounds coke (10% ash which is 50% acid oxides)
800 × .10 × .50 = 40 pounds acid oxides from coke.
135.6 + 40 = 175.6 pounds total SiO_2 or equivalent to slag.
(Note: If sprue is charged with sand coating, this SiO_2 should also be added to above.)

Limestone ($CaCO_3$) Charged:

100 pounds $CaCO_3$ = 56 pounds CaO when burned, therefore:
300 × (56 ÷ 100) = 168 pounds total CaO to slag.
Thus, the approximate CaO to SiO_2 ratio is:
168 ÷ 175.6 = .95

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Man to Man

By RALPH L. LEE

Foundry Mess Prevention

"Order is one of the basic fundamentals. Disregarded, it can play hob with even the best intentioned and hardest working foundrymen"

IT'S BEEN spring housecleaning time in our foundry, and I must say that it hasn't been the result of sterling business standards. I was shamed into the project by the example set by Mother (Mrs. Lee, home superintendent, vice president in charge and now chairman of the board). Isn't it funny how example can whip us into action, although table-pounding commands usually fail?

I'm happy to report that the foundry housecleaning job hasn't turned out to be the stinker I thought it would. Things were in pretty good shape. One reason for it is, I guess, that both the foundry and the pattern shop are so small that I couldn't get through them, let alone do any work, if I dropped things where I used them last and let the dirt pile up.

Then, too, I imagine, it's the way one was brought up and the habits he's gotten into that either mess up a place or keep it respectable. Keeping up with the ever increasing number of Jones Foundries who have proved to the world that a foundry doesn't have to be a dirty, stinky, dangerous place can put a burr under the tail of the cleaning nag, too.

I imagine that most of us have been in foundries where boards, flasks, patterns, scrap and sand left over from finished jobs pile up to a point where the place clogs up. Then everybody's got to stop what he's doing to clean out the joint, and it doesn't take long until it's right back where it was again. Mother said, "Folks like this ought to be ashamed; it just isn't decent."

John Linabury, pioneer foundry mechanizer and honorary chief engineer of the Lee Hobby Foundry, told me of one foundry he visited where all the molds were dumped into one huge pile, at least 10 ft high, he estimated. "When the shipping boys wanted to fill an order, they had to do a bit of mining, go around probing for castings they were told were there some place," he said.

Then there are foundries I've seen where they never do clean them up, where one mess is pried over just far enough to make another mess. Folks in a place like that probably get to be like mountain goats with ball-swivel ankles. I imagine that, like sidehill roonies, they have quite a time trying to walk on flat ground. How a real, honest-to-goodness casting can be made in a dump like that is beyond me. And here's another thing: Looking back on all of these foundries, I don't believe there was one where the boss had a clean desk.

On one foundry visiting trip all over the country, I discovered that without exception every messed up foundry (housekeeping wise) also was messed up from a business standpoint. It's more than funny how good housekeeping invariably goes hand in hand with a good statement, a good safety record and a good employee relations record. By the way, it wasn't just the little foundries that were messed up; some of the big ones were dillies.

But, getting back to my own foundry, it didn't take long to give it a thorough cleaning, although Mother will quarrel with my use of the words "thorough" and "cleaning." If I let her have her way, I honestly believe she'd have had chintz curtains on the windows and linoleum on the floor (which would be quite an experiment at that).

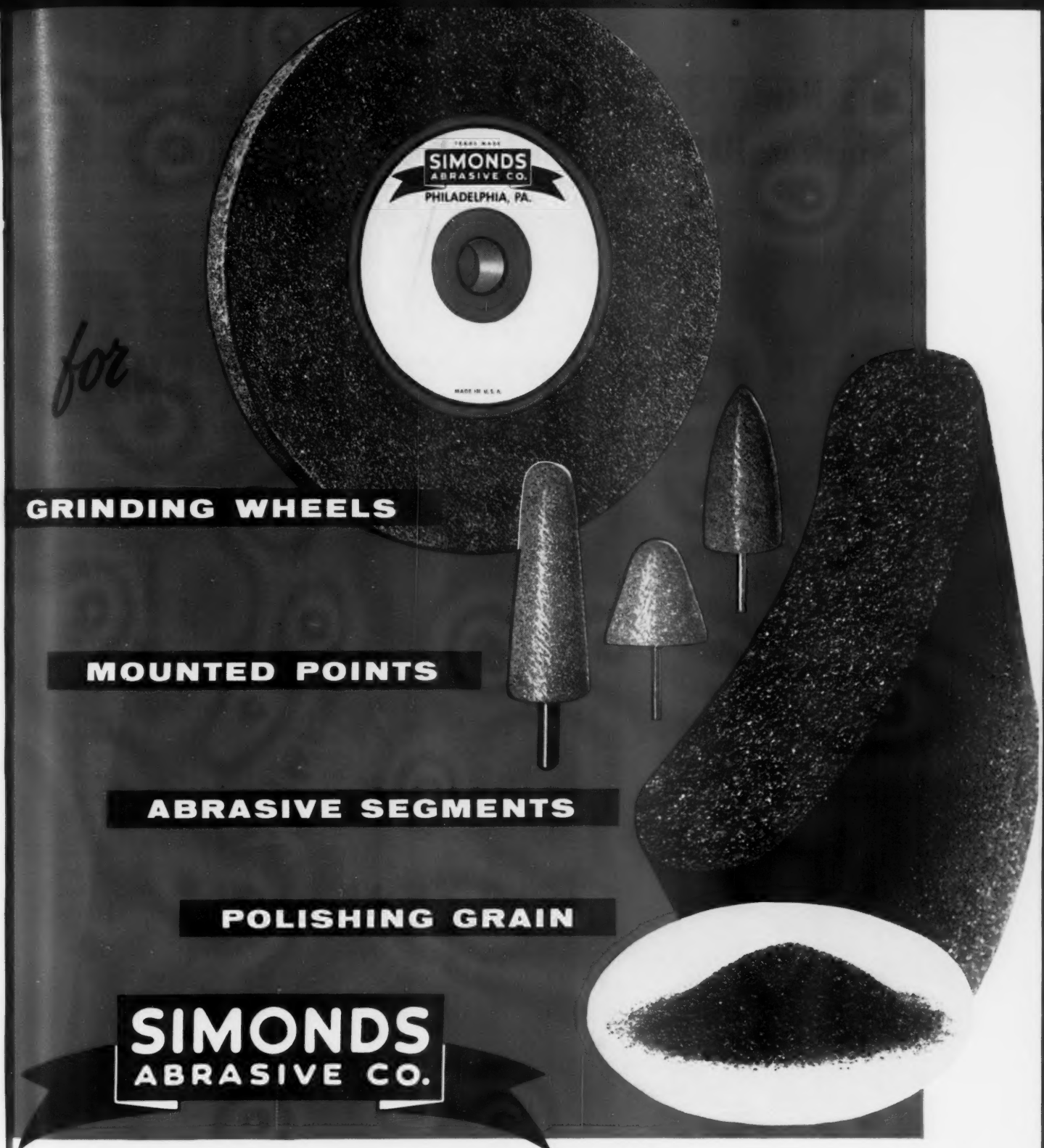
"A place for everything and everything in its place" is certainly a well worn and hackneyed bromide, but, doggone it, living up to it (to the letter of the law, that is) is far from being hackneyed. I have found that it is darned hard to do. Setting up a handy place for everything is quite a chore in itself, for if the place isn't handy, no power on earth can force busy people to put things back into it. Choosing the handiest place involves sort of a rough and tumble time and motion study. The first stab at the job frequently turns out wrong, but keeping at it until it's right sure does pay off. Maybe I'm a fanatic, but I don't care what I'm called.

Even dirt must have its place; in fact, different kinds of dirt should have different places. In our pattern shop we have one place for small pieces of wood scrap and another for large, both handy to the machines that make them. Then there's one place for inflammable floor sweepings, wrapping paper, cardboard boxes, string and stuff and another for fireproof junk. All this is so elementary that I blush to mention it. But I'm going right ahead and blush as I recall the places I've been in and what they could do for themselves if they got hep with a hunk of "mess prevention."

Similar provisions for mess prevention also have been made in the molding room, nonferrous and ferrous melting rooms and the cleaning and material storage areas, including places for everything to hang in, lie in or sit on. In the places where they belong, I have roughly outlined the shape of the tools less frequently used. These empty images literally scream for the return of their tenants.

We haven't quite made the grade yet, but one of these days, so help us, the floors are going to be cleared for easy sweeping. We're well on our way. Boy, what a difference it does make when I can sweep without moving and lifting everything under the sun. Here is a mess prevention stunt that really works; it invites clean floors. Nothing will ever make me believe that anybody likes to wade around in trash and dirt.

I have found that with tried and proven handy places for everything, it's easier to put them where they belong when you're through with them than it is to find a place where they don't belong. Under the mess prevention system, a fellow gets so much in the habit of putting things



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where they belong when he's through with them that he does it automatically, without thinking, leaving his mind clear to concentrate on the job at hand.

As we all know, there's something about a well kept place that does things to us down inside, affecting our judgment, skill, honesty and relationships with the other fellow. "Decently and in Order."

This spring I found that I couldn't clean house without taking an inventory, even though we have sort of a running inventory control in the form of three blackboards, where we put down the things and stuff we're running out of. But this year our inventory went a step further. I took an inventory of the ghosts which are forever haunting the place —ghosts like, "one of these day I'm gonna do this, that and the other thing." Every time I've gone near the Lee diaphragm molding machine, I've been haunted by the idea of changing the pitch of the screw on the pressure control valve, making it hard for me to mind my business. The tumbling barrel haunts me with the need for a better way to tighten the lid. Every revolution throws a little stream of dirt.

I decided to herd all of these ghosts together and nail them down in black and white so I could knock them off one at a time. And what a list it turned out to be—47 spooks from all over the place. Now I find that I can thumb my nose at these distracters, knowing that they can't get away from me. I have noticed, too, that down on paper they automatically arrange themselves in the order of their relative importance and timeliness. I've already knocked off three and am making sort of a game out of handling the rest.

I used to feel rather timid while

"Gee! Sure hope he stays nicely propped up like that until the boss discovers him!"

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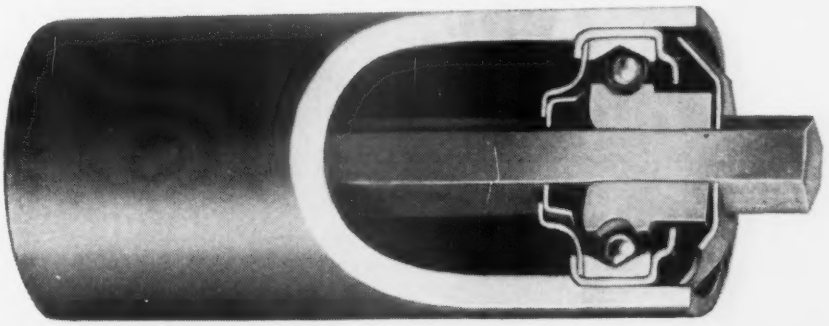
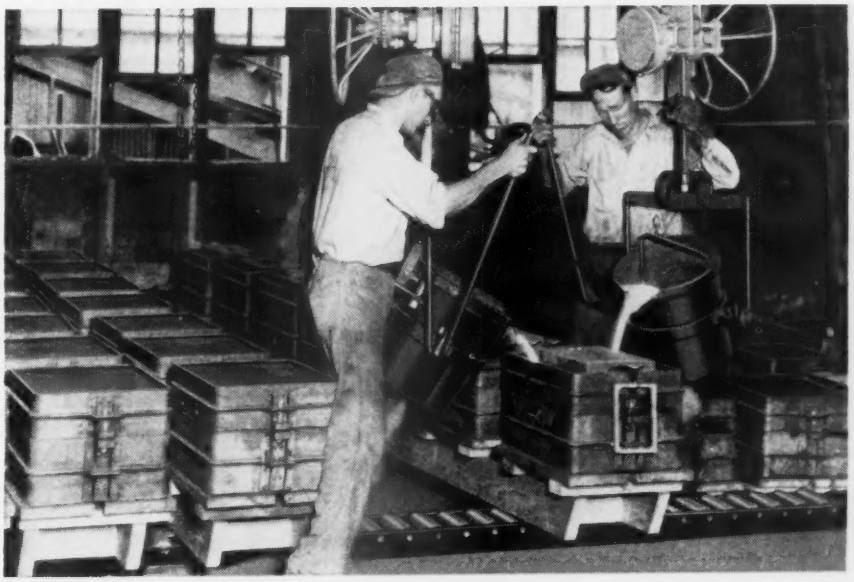
Are Expressly Designed for Foundry Conveyor Service





Every Standard roller conveyor is equipped with specially designed bearings that provide the maximum of protection and durability in foundry service. Spillage of hot iron is guarded against by special steel shields. These convex shaped shields fit into the ends of rollers to repel foreign matter. An exit for small particles is provided by an opening at bottom of shield.

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Batch No.	% Incoming Moisture	Sand Temp., Degrees F	% Outgoing Moisture
1	1.0	70	3.8
2	.6	70	3.9
3	.45	110	3.8
4	.3	130	3.8
5	.35	165	3.9

Every foundry is fighting ever mounting costs and shrinking profits. Investigate the cost reducing possibilities offered by Dietert-Detroit Automatic Sand Tempering—Cycling—Bond Addition and Sand Distribution Equipment.

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writing about the goings on in the Lee Hobby Foundry, realizing how tiny it is and how amateurish, but I don't any more. In fact, I'm getting downright brazen as time goes on. After all, when you get right down to it, the only difference between our peewee place and the big boys is a matter of square feet, just shifting the decimal point a bit. The steps in making a casting are identical. Maybe by shucking off some of the zeros that account for size we can see the fundamentals more clearly.

There is no question in my mind that order is one of the basic fundamentals. This fundamental isn't nearly as exciting as electronics, automation and mechanization, but disregarded it can play hob with even the best intentioned and hardest working foundrymen. Maybe a national foundry mess prevention week might be in order—if not this year, maybe next. It's just a thought.

ASTM Issues 1954 Supplements To ASTM Book of Standards

American Society for Testing Materials, 1916 Race St., Philadelphia 3, has published the 1954 supplements to the 1952 edition of the *Book of ASTM Standards,* which is issued triennially. Together with the 1952 volume and the 1953 supplements, they give in their latest form all the society's specifications, tests, definitions, etc., except the chemical analysis of metals. The 1954 supplements are in seven parts and give in latest form 415 specifications, tests and definitions which either were issued for the first time in 1954 or have been revised since their appearance in 1952 or in the 1953 supplements.

Part 1, *Ferrous Metals* contains 608 pages and includes 89 standards, among which cast iron is one. *Part* 2, *Non-Ferrous Metals* is made up of 81 standards including those which cover copper and copper-base alloys, aluminum and aluminum-base alloys and magnesium and magnesium-base alloys. Each is priced at $3.50.

American Standards Indexed

A 48-page publication listing and indexing about 1500 American standards for construction, civil engineering, mechanical, electrical, safety, chemical, metallurgical, mining, and a miscellany of other applications has been issued by the American Standards Association, 70 East 45th St., New York 17. Copies may be obtained from the association.

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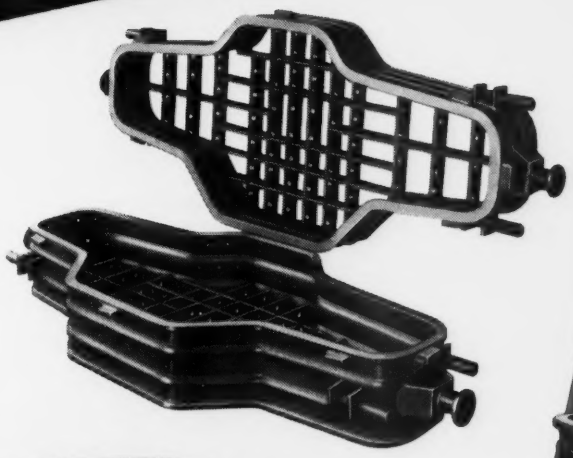

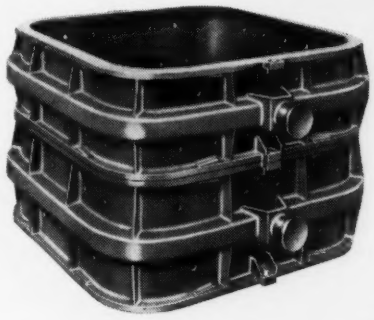

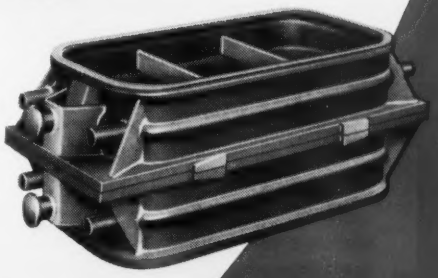

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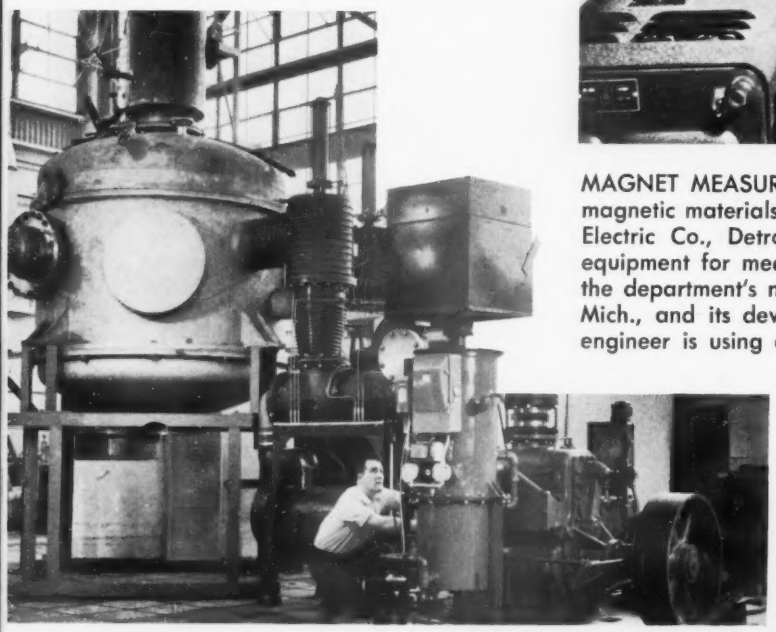
News Views

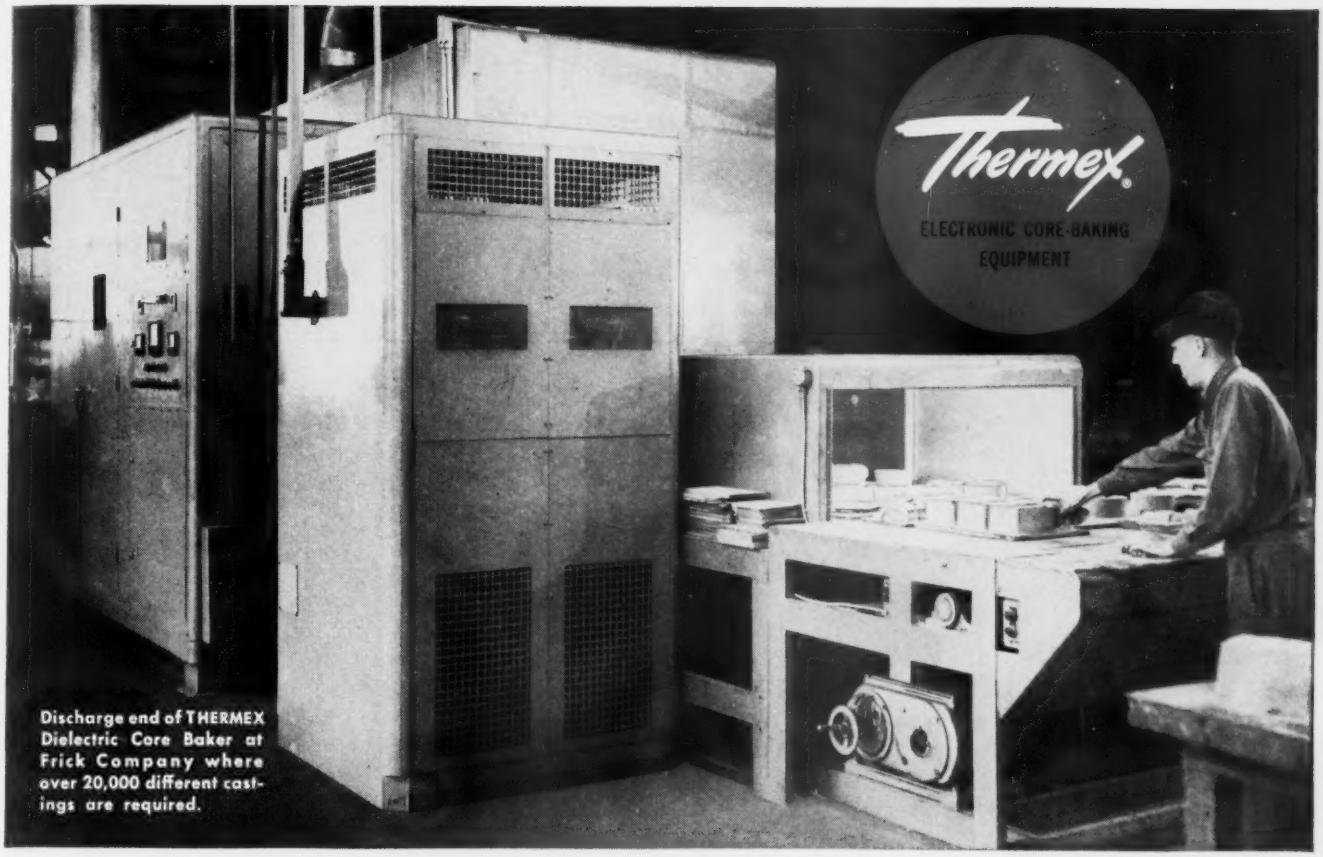
FLEXIBLE FURNACE: Consolidated Vacuum Corp., Rochester, N. Y., recently shipped to Westinghouse Electric Co., Blairsville, Pa., the first modular type, 1000-lb-capacity high-vacuum furnace. Westinghouse will melt 350 lb-charges and will pour single ingots. Slight changes can be made without disturbing the basic installation that will expand the 350-lb furnace to 1000-lb capacity and permit semicontinuous pouring of single, multiple or centrifugally cast ingots

MAGNET MEASUREMENTS: A laboratory for measuring and analyzing magnetic materials has been opened by Carboloy Department of General Electric Co., Detroit. It is said to contain every conceivable type of equipment for measuring magnetic fields and is the hub of activities for the department's new permanent magnet manufacturing plant in Edmore, Mich., and its development foundry in Detroit. In the view above, an engineer is using a Brush oscillograph to record Thermistor performance



IN RESPECT: A photograph of the late Fred C. Boyce, former president of D. J. Murray Mfg. Co., Wausau, Wis., was accepted from the company's employees at a recent annual meeting by newly elected president A. W. Plier, left above. Shown with him is Mr. Boyce's son, Fred, now a company director

SPECIAL TEST: Mold Surface Committee of the American Foundrymen's Society met recently at Michigan State College to test six special core sand mixtures and three types of core washes. Standard gray iron samples were poured to study defects of metal penetration, veining and finish smoothness. Standing in back, left to right, are Edgar Haller, J. B. Clow Co.; Hans Heine, AFS; C. E. McQuiston, Advance Foundry Co.; O. Jay Myers, Archer-Daniels-Midland Co.; J. A. Ridderhoff, Frederic B. Stevens Inc. Kneeling are Anton Dorfmueller Jr., Thiem Products Inc., and C. S. Sigerfoos of Michigan State College



Discharge end of THERMEX Dielectric Core Baker at Frick Company where over 20,000 different castings are required.

How Frick Company has improved core quality and working conditions

REPLACING conventional ovens with a 75 KW THERMEX* Core Baker at Frick Company, Waynesboro, Pa. has resulted in improved core quality . . . faster, more flexible production . . . a cleaner core room and saving of floor space.

IMPROVED QUALITY. Uniform electronic baking gives smoother core surfaces and greater dimensional accuracy. No longer necessary to paint cores to prevent iron penetration.

IMPROVED WORKING CONDITIONS. No smoke. No oven heat. Cores are cool enough to handle immediately after baking . . . move faster to finishing and pasting.

Find out how THERMEX Core Baking Equipment can improve your core room efficiency. Write today for data booklet on Electronic Core Baking. The Girdler Company, Thermex Division, Louisville 1, Kentucky.

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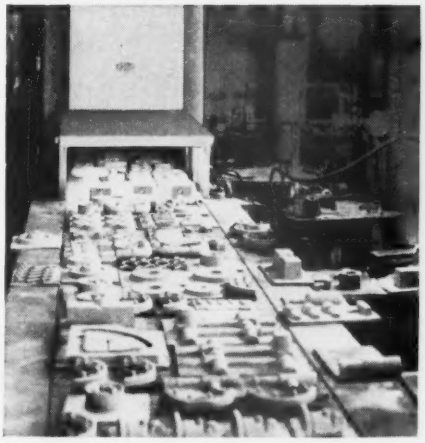

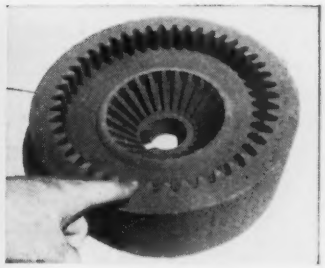

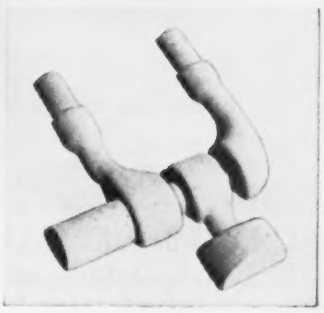

Intake end of THERMEX Core Baker showing variety of cores on belt, which moves at about 7 inches per minute. Typical Frick cores where accuracy is important: (Right above) For portable sawmill gear. (Right below) For ammonia valve body.

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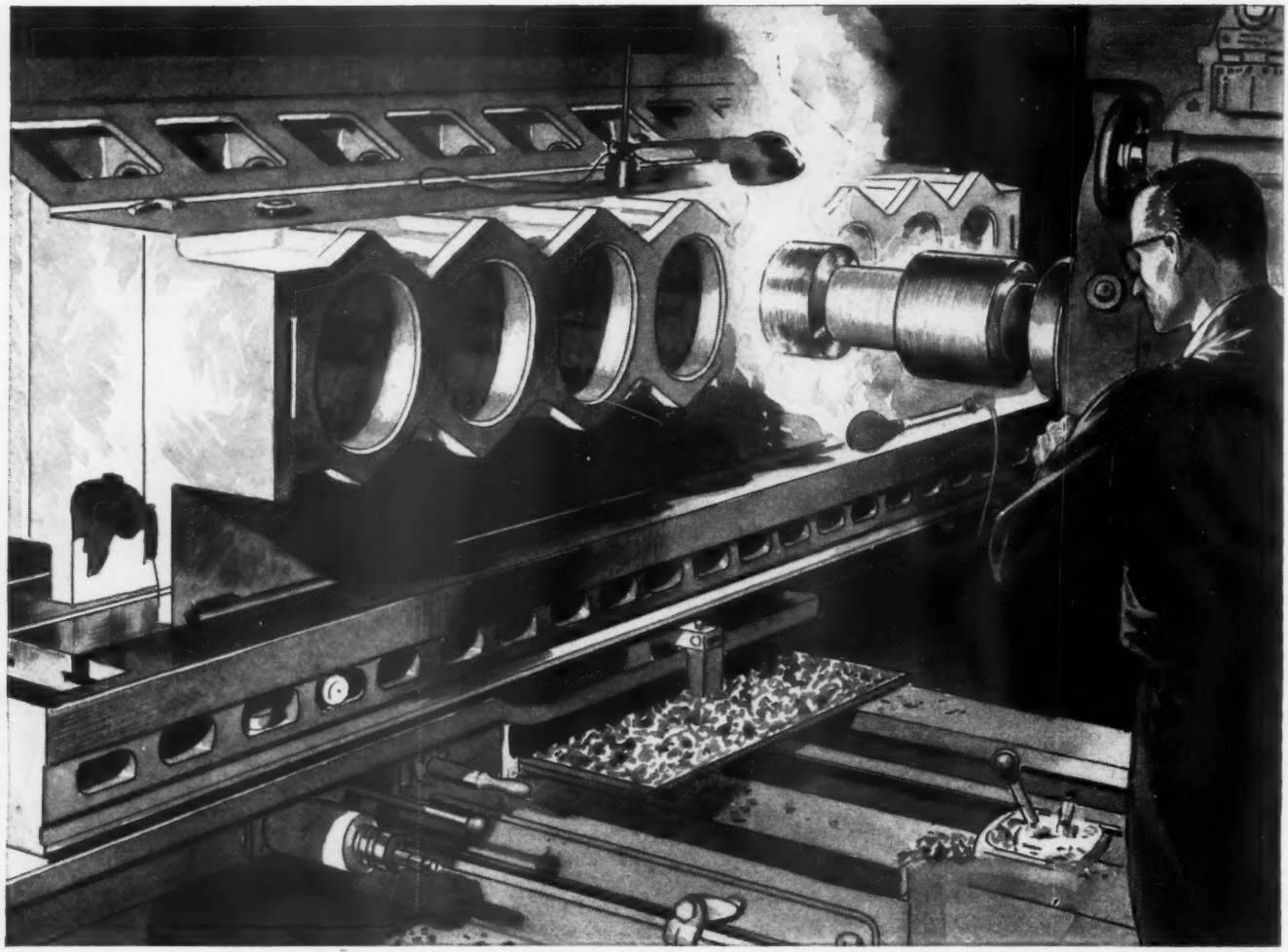

Today's high-speed machining operations make it more important than ever to control the structure of iron castings. Castings with chilled corners and edges or hard spots may cause costly tool breakage and interrupted production.

An effective, low-cost method of insuring satisfactory machinability is the addition of SMZ alloy to the iron in the ladle. An addition of only 2 to 4 lb. per ton of iron is sufficient to reduce chill, control the uniformity of structure, and produce castings with excellent machinability.

SMZ alloy is a balanced inoculant containing 60 to 65 per cent silicon, 5 to 7 per cent manganese, and 5 to 7 per cent zirconium. Further information about the advantages of using SMZ alloy will be gladly furnished on request. The ELECTROMET office nearest you will be pleased to answer your inquiry.

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Around the Country

NEWS REPORTS FROM

Chicago . . . Detroit . . . Pittsburgh . . . Philadelphia

Detroit—Federal - Mogul Corp., producer of brass, bronze and aluminum bushings and bearings, is closing its entire Detroit operation on June 30. According to Frank Churley, director of public relations, continued operation is economically unsound. It is anticipated that the foundry will be sold, although no definite arrangements have been made as yet. None of the Detroit operation will be moved to any of the company's five plants in other cities, and only a few supervisory personnel will be moved.

In the same field but on the other side of the fence is Superior Brass Works Inc., which has just completed a $28,000 remodeling and re-equipping job on its bushings foundry. Employing six molders who pour 10 tons of brass and bronze daily, the company turns out an average of 20,000 bushings every 7½ hr. Included in the new equipment are a drawer type core oven, a tilting furnace, a sand conditioning and distribution system, gravity roller mold set-off and flask return conveyors, an oscillating pan conveyor for handling dumped molds and an airless blast tumbling machine.

New Haven Foundry Co., New Haven, Mich., has started construction of a 33,600-sq-ft building to house modernized molding operations for its gray iron foundry. All other foundry processes will continue in the old building on the same property. Initial castings production in the new building is expected by the middle of December. Construction is by Commercial Contracting Corp., Detroit, and architectural work is by Giffels & Vallet Inc., Detroit.

Ford Motor Co. also is continuing its expansion program. Current plans include additional equipment installations to increase production at the Dearborn iron foundry and the specialty foundry in Dearborn, Mich., and at the Cleveland foundry. In addition, a building enlargement is planned for the Cleveland foundry. Increased castings production is necessary to meet increased production schedules in the engine plants. No dates have been set for the start of any of these expansions, although they will occur in the near future, according to Frank X. Bujold, manager of foundries, Engine and Foundry Division, Ford Motor Co., Dearborn, Mich.

Philadelphia—Gray iron casting business is somewhat improved. Most job shops are now operating at five days a week although with restricted working forces and with output at around 75 per cent of normal. Pipe shops are running 100 per cent of normal capacity, reflecting good seasonal activity in building construction.

Improvement at the jobbing foundries is traceable to a fairly general betterment in demand, featured particularly by more auto die work and brisk business from the textile machinery manufacturers. However, foundry backlogs still average no more than two or three weeks and price competition among jobbers remains keen.

Steel casting business is also highly competitive. Operations average around 75 per cent or maybe a shade better, and buyers have little difficulty in obtaining shipments within a month. Malleable shops are averaging 80 per cent or better, with backlogs running five to six weeks.

Brass and bronze activity ranges from fair to good. Most shops are maintaining a five-day weekly schedule, but with limited crews. Light metal shops are active, but backlogs are off, new business in aircraft and radar work is off.

American Engineering Co., Philadelphia, subsidiary of Hayes Mfg. Corp., Grand Rapids, Mich., has closed its gray iron foundry after an operation of 55 years. The company is now buying its requirements

SHOWING THE WAY: The borough of Manhattan, New York, recently began installation of 14,000 street signs, frames and fixtures cast of an aluminum-zinc-magnesium alloy, developed by Federated Metals Division, American Smelting & Refining Co., New York, which makes possible high-strength castings without heat treating. The signs are guaranteed to be rustfree and shiny 15 years from now. Casting was done for Municipal Street Sign Co., Brooklyn, N. Y., by Littlestown Hardware & Foundry Co. of Littlestown, Pa. A. Nickamin, manager, aluminum department, Federated Metals, is shown examining the first installation

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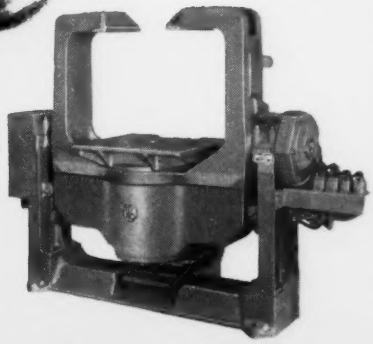
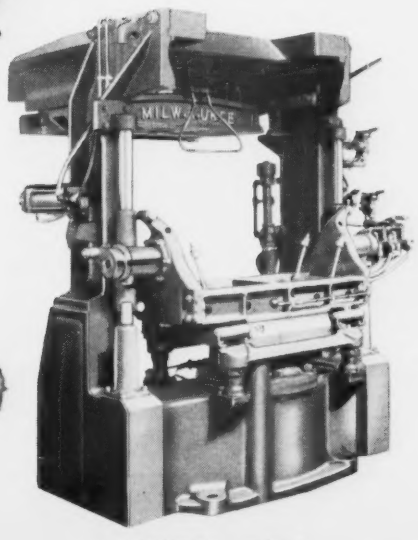


MODEL 9546



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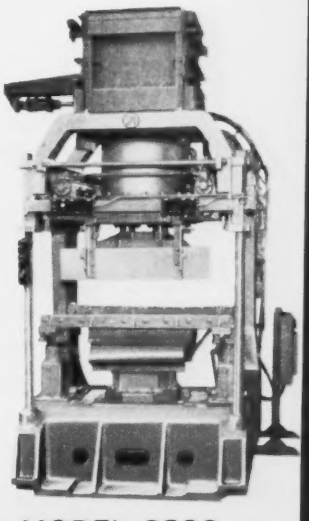


MODEL 2302

for marine machinery, pumps, hoists and stokers. The foundry had a capacity of 500 tons per month.

Chicago—Steel and malleable foundries in this area have experienced a considerable pickup in orders in the past three months or so. In some cases there is enough business on books to make good operation for the remainder of the year reasonably certain.

Business of gray iron foundries serving the automotive industry has been very good for some seven or eight months, and as of mid-May prospects continue good. Many captive shops are faring well too, but a good many jobbing foundries are finding 1955 a rough year.

The upturn in demand for steel and malleable castings is paced by expanded buying by the railroads. At start of 1955, the carriers weren't figured to spend much money because freight car loadings had been declining steadily throughout 1954. Improvement in carloadings has been noteworthy so far this year and although net earnings have not been proportionate, railroads are spending more generously for equipment and maintenance.

Buying includes locomotives and freight cars, considerable repairing of old equipment, some new type passenger trains, and a fair volume of new passenger coaches. All of these use steel and malleable castings and some gray iron castings.

For some foundries business is so thriving at present that deliveries are proving to be a headache. Customers are demanding the same deliveries they got in 1954 when operations were slack.

Foundry operations will slacken somewhat in this area during July. This is because a good many shops will close down for vacation periods.

New York—While leaving much to be desired by operators, gray iron foundry production is a shade better. Most shops are working five days a week. But they are still working with limited crews and it is nip-and-tuck in most cases to even sustain present operations. Some plants specializing in construction requirements find the going fairly comfortable, but such cases are exceptional. Backlogs at most gray iron job shops run around two weeks or so.

In contrast, the brass and bronze shops are active. This applies not only to most captive shops, but to a large number of jobbing foundries as well. In some cases these latter are catching the overflow from the captive foundries.

Aluminum shops report less aircraft demand, which is affecting backlogs to some extent. However, actual operations are still good.

There now is little malleable and steel casting capacity in this area. But such as it is, it is fairly well engaged.

Pittsburgh—Foundry equipment sales are gaining. One firm selling shell molding equipment reports March sales were higher than any month in the past two years. Nonferrous and gray iron foundries lead the way in taking more equipment. Salesmen returning from the South report that district is expanding its foundry operations rapidly.

Blaw-Knox Co., Pittsburgh, says March saw a pronounced improvement in new orders for foundry work. This gain continued into April. March gains reflected sharp upturns in steel operating rates and more than the usual seasonal gain in orders from the construction industry.

Foundrymen are generally optimistic about second quarter, while agreeing that the third quarter will continue highly competitive. Both steelmaking and machinery production are on the rise. Steel foundries have accumulated a modest backlog. However, defense work is still low, and price competition holds profits low. Over-all the situation is improved.

HOW TO DO IT

By LUCIANO MARCHI
Superintendent
Establecimientos Metalurgicos Corni Argentina
Tigre, Buenos Aires
Argentina

Reinforcement Plate Prevents Metal Run-Out During Pouring

A FOUNDRY in South America had the problem of pouring delicately thin typewriter carriages molded in 8⅝ x 17¼-in. slip flasks. Casting required hot iron to flow completely throughout the mold. This hot iron could not be obtained always because of low quality coke and other factors. Percentage of rejects from cold iron was high. It was thought the addition of a riser would solve the difficulty.

Because the casting occupied nearly all the mold, it was necessary to place the riser in one corner close to the outside edge as indicated in Fig. 1. In practice this riser location was poor because the flask had no jacket and metal ran out during pouring.

To overcome the problem, the foundry superintendent devised a reinforcing plate with handle,

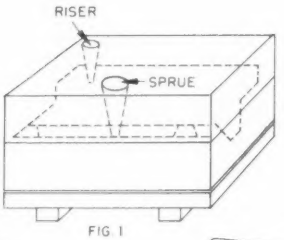


FIG. 1

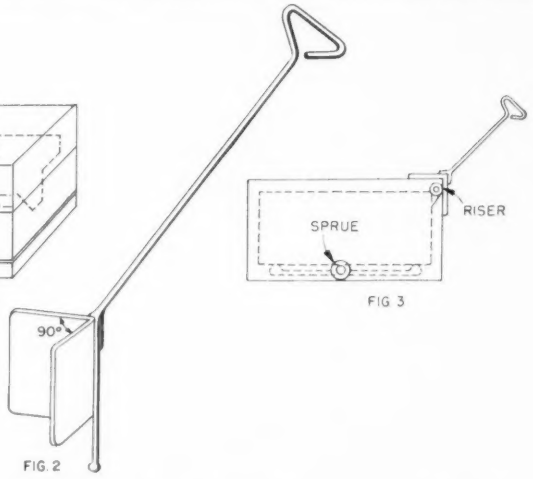


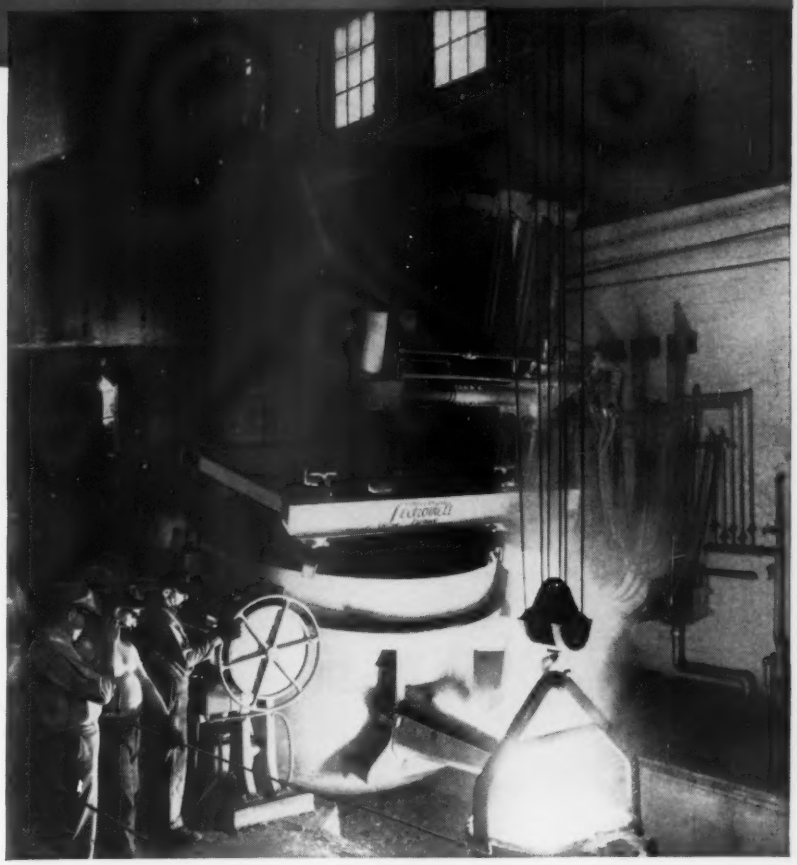
FIG. 2

FIG 3

Fig. 2, to fit snugly against the corner of the mold at the moment of pouring, as shown in Fig. 3, until the riser had solidified. Use of the reinforcing plate enabled the foundry to utilize available equipment and pour the carriages with success and minimum loss without need of expensive pattern modification.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $15 for each idea submitted and published. Send a photo or drawing with your idea

if you judge a furnace on performance...



For 34 years Empire Steel Castings, Inc., has depended on this Lectromelt Furnace. Rated at 1½ tons, it consistently pours 2½ to 3-ton heats.

Top charging of their new 5-ton Lectromelt Furnace requires only 3 to 5 minutes, compared with 25 to 35 minutes for door-charging.

A rugged, 34-year-old Lectromelt* Furnace still works full time at Empire Steel Castings, Inc., Reading, Pa. Empire says, "It's as good as the day it started. Better, in fact, because we found we could pour additional power to it, so we get heats out faster than we first dared to."

On the basis of the performance and reliability of Empire's old furnace, they recently bought a new 5-ton, top-charging Lectromelt. Now they get much closer temperature and chemical control. And new, pin-point analysis control enables them to duplicate uniformity and high grade of molten metal in lot after lot of stainless.

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Obituary

ROBERT C. WOODWARD, 68, until his retirement last year, chief metallurgist, Bucyrus-Erie Co., South Milwaukee, Wis., died Apr. 20. A graduate of Stanford University, Mr. Woodward was associated with Sweet's Steel Co. and Lycoming Motors Corp., Williamsport, Pa., and National Brake & Electric Co., subsidiary of Westinghouse Air Brake Co., Milwaukee, until 1935 when he joined Bucyrus-Erie Co. During World War II he served as superintendent of the company's foundries and pattern shops. Mr. Woodward was president of the Wisconsin Chapter of the AFS in 1948-49.

* * *

Carl F. Mayer, 59, president, Carl Mayer Corp., Cleveland, designer of industrial ovens and furnaces, died suddenly Apr. 20. Mr. Mayer was graduated from the University of Michigan in 1918 and spent a year

CARL F. MAYER

with the United States Shipping Board. After 3 years as engineer with Ohio Body & Blower Co., Cleveland, he became associated with Swartwout Co., there, as manager of its oven division. In 1930 he was named vice president of the Foundry Equipment Co., Cleveland, and four years later became treasurer of the Smith-Mayer Corp. This became Carl Mayer Corp. two years later, with Mr. Mayer as president and treasurer. In 1953 Mr. Mayer was a recipient of the Trinks Award for outstanding contributions to scientific and economic progress in the industrial heating industry.

* * *

K. C. Gardner, 78, chairman of the board of directors, United Engineering & Foundry Co., Pittsburgh, died Apr. 15. A graduate of Case Institute of Technology, Mr. Gardner was associated with the company since it was organized in 1901. He was president-general manager from 1943 to 1952.

* * *

Claude B. Schneible, 64, president, Claude B. Schneible Co., Detroit, died suddenly Apr. 15. Mr. Schneible attended Northwestern University, and

CLAUDE B. SCHNEIBLE

from 1918 to 1924 was associated with American Foundry Equipment Co., now American Wheelabrator & Equipment Corp., Mishawaka, Ind. After 4 years in engineering research he returned to American Wheelabrator as factory representative. In 1935 he organized his own company in Chicago to engage in engineering, design and manufacture of dust and fume control equipment. The company was moved to Detroit in 1943.

Mr. Schneible was president of Foundry Educational Foundation in 1950, and its chairman in 1951. He served as president of the Foundry Equipment Manufacturers' Association in 1953. At the time of his death he was chairman of the Detroit Chapter of the American Foundrymen's Society and also was serving as a national director of the society.

* * *

Albert C. Carbo, 62, co-owner Carbo Foundry & Machine Shop, Alexandria, La., died Apr. 8.

* * *

G. A. Grader, 55, since 1946 president, Bedford Tool & Forge Co., Bedford, O., died Apr. 25.

* * *

E. M. Weinfurtner, 65, president, North American Refractories Co., Cleveland, died Apr. 15.

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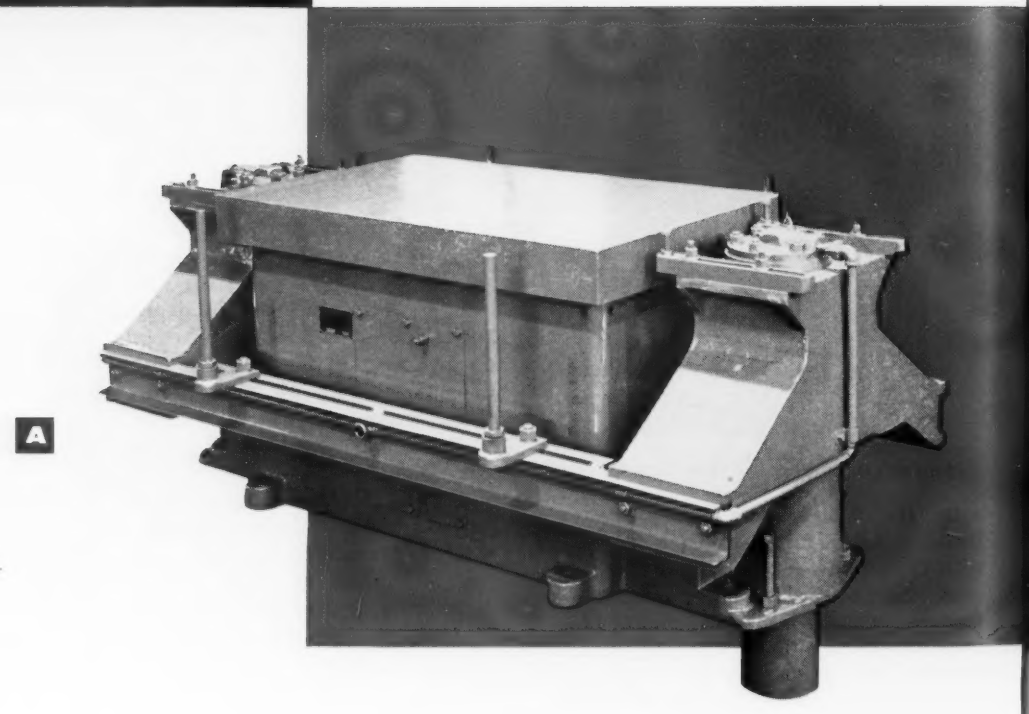

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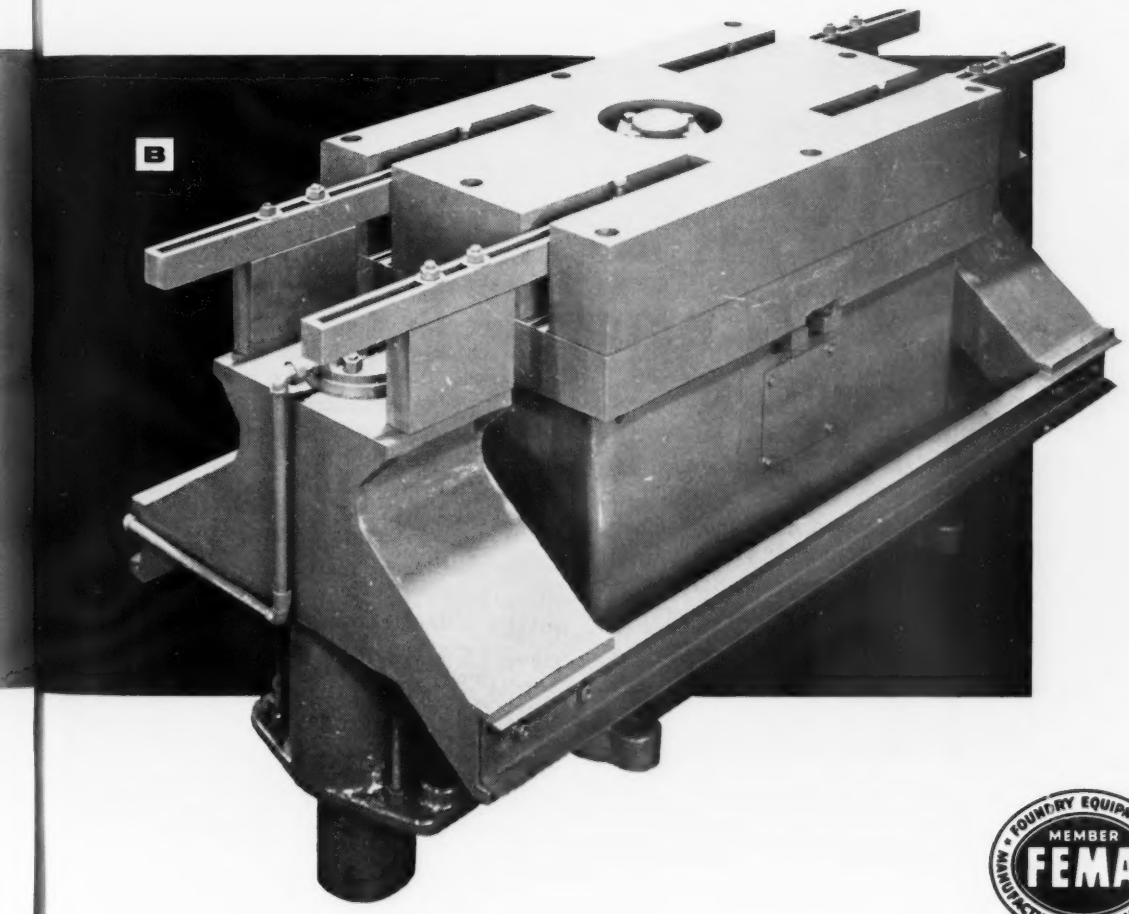
The jolt strip machines pictured here, for example, are designed for short-run, jobbing-type work. These machines have 20 x 36 inch tables and 1700 pound lifting capacities. In order to handle varying flask sizes, they are equipped with adjustable stripping devices. The machine in illustration A has stripping pins. In illustration B the same machine is equipped with a pattern stool and adjustable stripping fingers.

Herman Jolt Strip Machines are available with lifting capacities ranging from 600 pounds, 10 x 15 inch table, to 73,000 pounds, 7 x 10 foot table. We'll be glad to provide more detailed information on these Herman machines, or have one of our engineers contact you.



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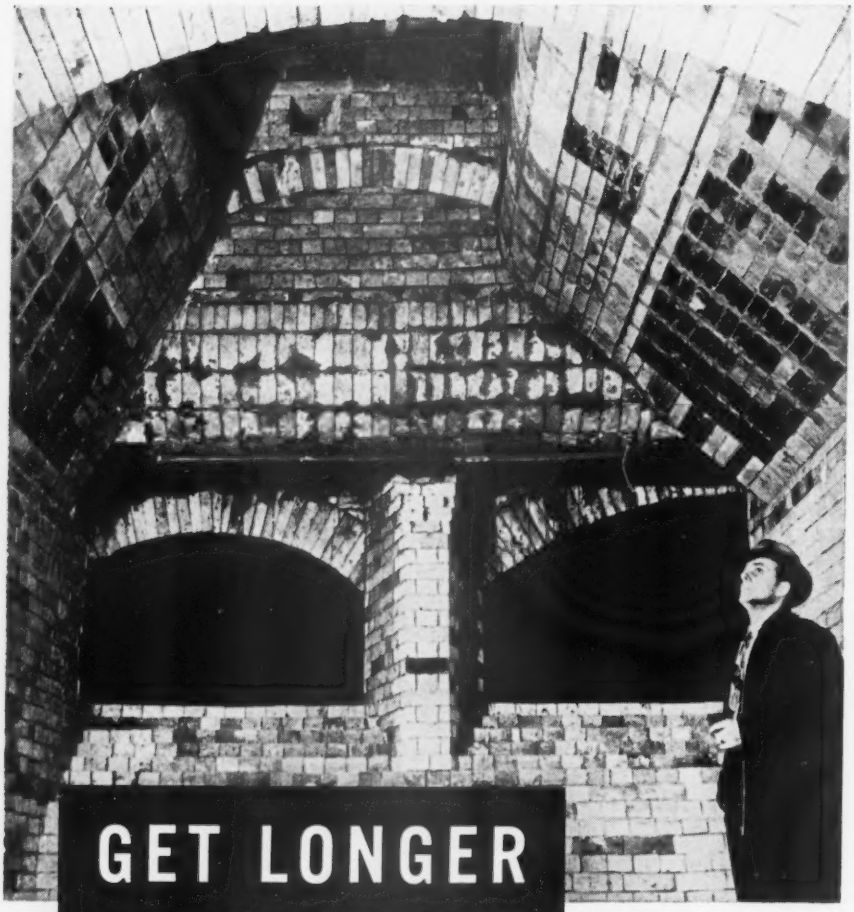

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Technical Papers Scheduled For Paris Foundry Meeting

The 28th annual convention of the Association Technique de Fonderie is to be held in Paris, on June 2, 3 and 4, at the Maison de la Fonderie, the association's premises. Chairman of the convention is Gustave Rivoire.

The following papers will be presented at the technical sessions: The exchange paper of the American Foundrymen's Society, by J. F. Wallace, Case Institute of Technology, Cleveland, and G. J. Snider, Rodman Laboratory, Watertown Arsenal, Watertown, Mass., has for its subject "Developments in the Process of Shell Molding at the Watertown Arsenal from 1951 to 1954".

"The Use of Silicones for Stripping Molds in Shell Molding" by M. Borel, of Societe Industrielle de Silicone et de Produits Chemiques du Silicium.

"Phenolic Resins in Shell Molding. Pre-coating of Molding Sand", by J. Girard, chief of laboratory of Societe 'La Bakelite.' "

"Cast-on Tenons" by J. Leonard, foundry consultant, Belgium.

"High Duty Castings for Diesel Engines", by C. R. Van der Ben, exchange paper of the Institute of British Foundrymen.

"Contribution to the Study of the Influence of Gases on the Structure of Cast Iron", by G. Blanc, director of research, and N. Volianik, research engineer, Centre Technique de Industries de la Fonderie, Paris.

"The Influence of Phosphorus on the Casting Characteristics and on the Structure of Grey Cast Iron," by M. Ferry, of the Centre Technique.

"Synoptical Chart of the Elastic and Mechanical Properties of Grey Cast Iron Ranging up to Nodular Irons," by R. de Fleury.

"Remarks on Pouring Under Pressure," by L. Grand, research department, Compagnie Pechiney.

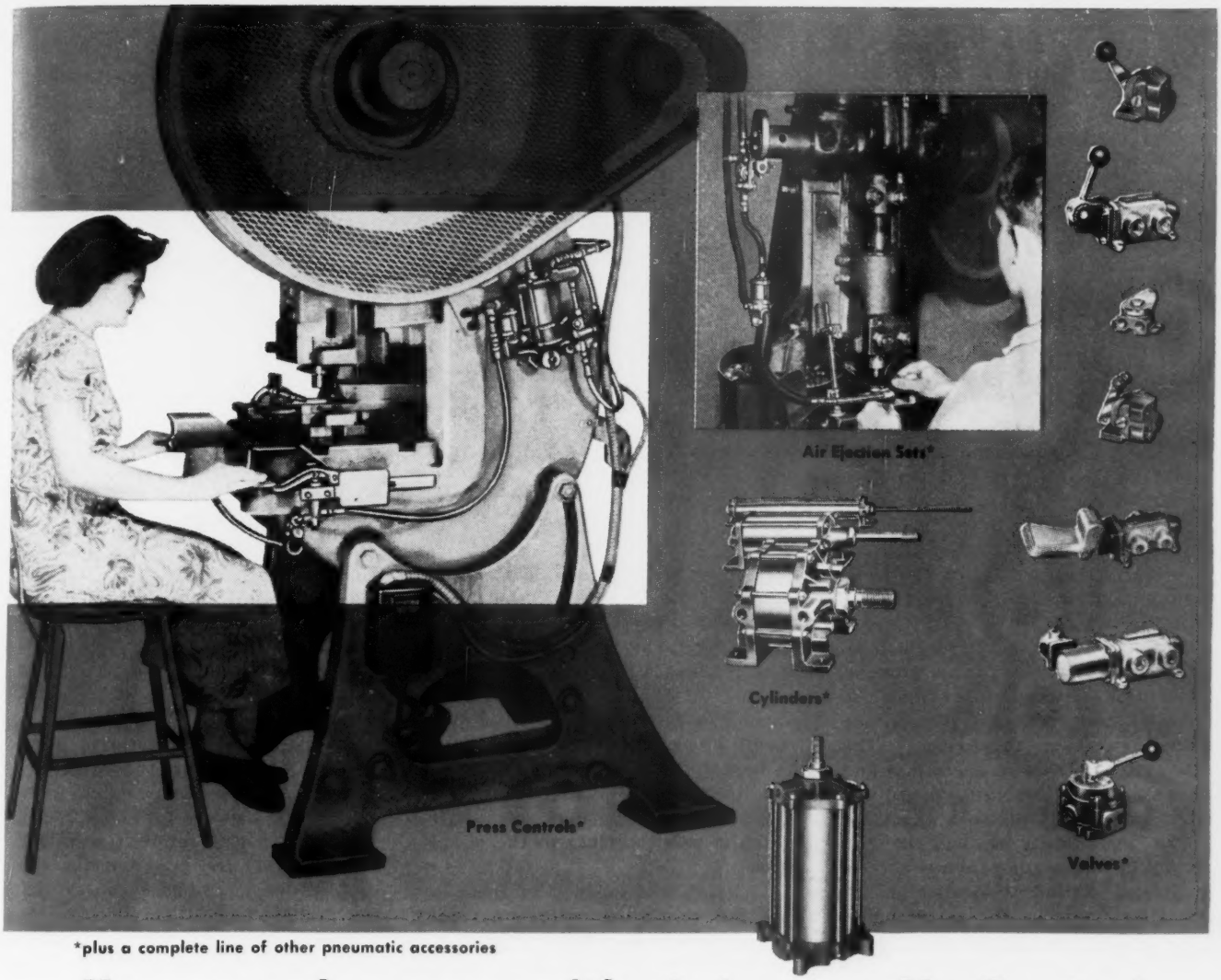
"Adjustment of the Technique of Manufacture of Light Alloy Pattern Plates, Pressure Cast in Plaster Molds," by L. Marotine, of the Centre Technique.

"The Problem of the Burden in the Siemens-Martin Open Hearth Furnace," exchange paper of the Verein Deutscher Giessereifachleute.

"Improvements in the Operation of Cupolas," by J. Guillamon.

"Measurement of Sand Permeability," by M. Walter, chief of laboratory, A.R.S.I.

"Rational Utilization of Fuel Oil in the Foundry," by G. Ulmer, of the Centre Technique.



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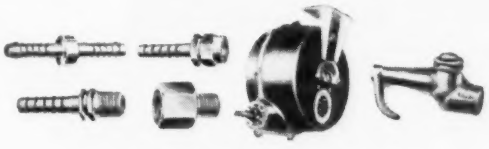

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Calling All Cranes!

General view of foundry yard and one crane shows the material storage bins. Crane is about to load some material into bins on charging floor

A NEW installation, and the first of its kind in the foundry industry, provides power line communication between two foundry cranes and three points on the floor at the International Harvester Co.'s, Milwaukee plant.

This new equipment permits instantaneous two-way conversation between these fixed stations and the crane operators and between the crane operators themselves. The new system speeds up operations and does away with the old-fashioned and often misunderstood hand signals.

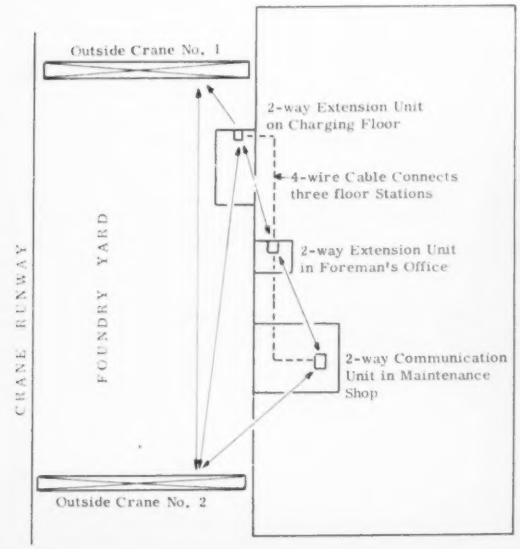
The installation is laid out as shown in the accompanying sketch. A ground station is located on the charging floor, in the maintenance shop and in the cupola stock room for the cupola general foreman's use. The two cranes work out in the open where they are subjected to all weather conditions.

One determining factor that led to the use of two-way crane communication was that these cranes are occasionally subjected to loss of power. This can be caused by the shoes getting off the rails or by the circuit breakers opening up due to an unexpected overload. Once when this happened, the crane operator was forced to sit in the cab, without heat, for an extended period. It was during the second shift when the cupolas were not operating, and it was not possible for the operator to call for help to ask someone to close the circuit breaker. At the same time, he hesitated to climb over the structure itself because of the danger that the circuit breaker might be put in while he was too close to the power rails.

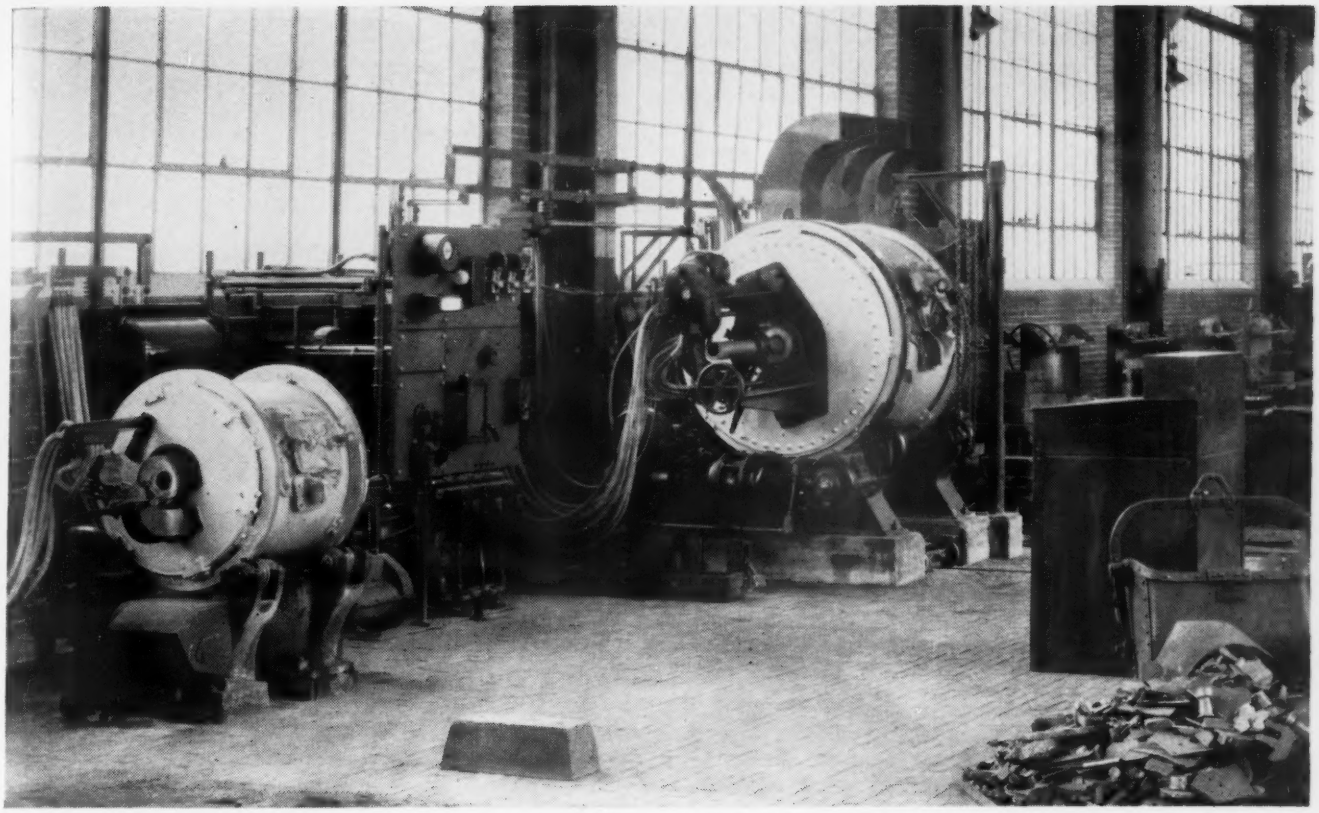
With this contingency in mind, it was felt to be mandatory that the equipment for the cranes be provided with emergency power units. These units include a six-volt storage battery plus a trickle charger to maintain the battery always at full charge. Whenever power is lost on the crane, therefore, the operator is still in two-way voice contact with the other crane and with the three points on the floor.

The equipment selected is known as the Femco Trolleyphone and is manufactured by Femco Inc., Irwin, Pa. It functions exactly the same way as a two-way radio unit, except that carrier current, modulated by the voice, is applied directly to the trolley wires that feed the cranes. This permits the conversation to be limited to the power circuits involved in this particular crane system. There is no radiation from the equipment to other sources and, therefore, no interference.

Cranes at this International Harvester plant are operated by 440-volt, 60 cycle, 3-phase power, and the Trolleyphones themselves receive power from this same source. The system provides instant and continuous contact between the stations, and it is a common-talking system. Each station is equipped with a press-to-talk microphone, and words spoken into any one microphone come out of all loud speakers. Calling is done by speaking the name of the crane operator or the number of the crane. An indefinite number of stations may

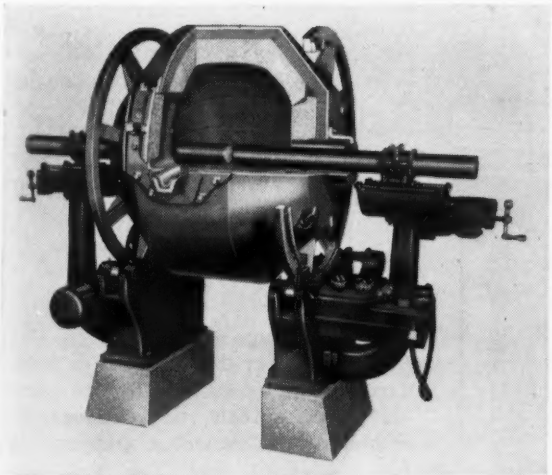

Outside Crane No. 1
2-way Extension Unit on Charging Floor
4-wire Cable Connects three floor Stations
2-way Extension Unit in Foreman's Office
2-way Communication Unit in Maintenance Shop
CRANE RUNWAY
FOUNDRY YARD
Outside Crane No. 2

Left—Sketch shows layout of installation, which provides communication between two foundry cranes and three points on foundry floor
Below—Maintenance foreman is provided with two-way extension unit. He can talk directly to crane operators and to other floor stations



Type LFA, 350 lb. capacity, left, and Type AA, 1000 lb. capacity Detroit Electric Furnaces. In operation for 25 years.

Two of the reasons why we can't depend on *replacement* sales



Cutaway view shows features of Detroit Rocking Electric Furnaces.

The two Detroit Rocking Electric Furnaces shown above are 25 years old. They've been producing high quality metal at Baker Perkins, Saginaw, all that time—and they're still in top shape.

Such long service records—not unusual for Detroit furnaces—may not promote replacement sales but they do make our customers happy!

Operating results are equally gratifying and enduring. The rocking action of these furnaces produce high quality, homogeneous heats with precise control of analysis. There's no carbon pick-up from the electrodes.

Lasting economies are part of the picture, too: Optimum use of power, minimum heat loss, less metal shrinkage, more heats per shift, less down-time because of longer refractory service and easy shell replacement.

Detroit Rocking Electric Furnaces are available in capacities from 10 to 8000 pounds. They're individually designed to fit your plant's electrical specifications.

Learn how Detroit Rocking Electric Furnaces can save you money. Outline your operating needs and let us give you the specific answers. Write today.

DETROIT ELECTRIC FURNACE DIVISION

Kuhlman Electric Company • Bay City, Michigan

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y.; MEXICO: Cia Proveedora de Industrias, Atenas 32-13, Apartado 27A3, Mexico 6, D. F., Mexico; EUROPE, ENGLAND: Birlec, Ltd., Birmingham.

Operator in crane cab can talk directly to other crane operator or to three floor stations

be used on any installation, and all the units hear, regardless of position, as long as they are in contact with the power source or have an emergency power unit.

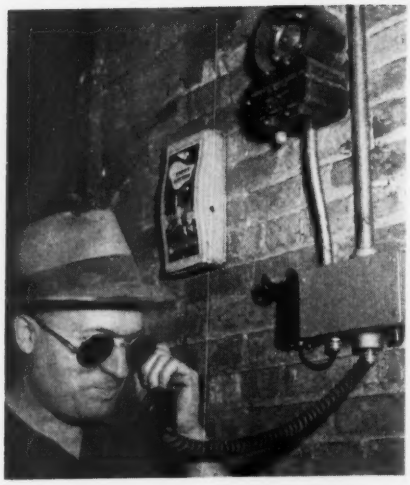
Typical orders given to the cranemen would be, "change from one pig iron to another"—"report what cars of material are now in the yard"—"report when a new switch comes in so that a prompt inspection can be made"—"make up materials for a particular job." Conversations between the crane operators generally deal with synchronizing their movements for better efficiency and with helping each other during their "break" periods.

The floor stations, which are merely extensions of the one stationary phone, are somewhat less expensive than the complete Trolleyphone. In this particular case each floor station was provided with a handset rather than with a microphone. There is also a loud speaker at each floor station so that any calls from other floor stations or from either crane can be heard over this loud speaker. Back-and-forth conversations between floor stations can be carried on over the handsets, just as is done over a usual telephone instrument. Such conversations are often necessary between charging floor and general foreman when types of iron are changed.

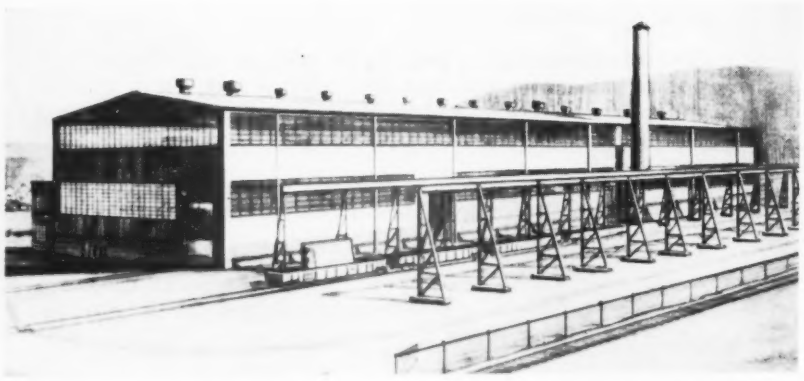
A special squelch circuit developed for the equipment keeps any line noises from coming out of the speaker while no one is talking. The speakers are absolutely quiet except when a call is made. Another feature is that with the FM circuit that is used, a noise blast that might occur during the conversation cannot exceed the level of the voice.

In addition to the advantages expected from eliminating hand signals, yells and numerous trips up and down the crane ladder, there is also the advantage that when something is wrong on the crane, the operator can call the maintenance department directly and report the difficulty in detail so that the repair men or electricians will have some idea what the trouble is before climbing aboard. It is often desirable for the maintenance department to contact the crane operator regarding a repair made or new part installed previously to check result, or to notify the craneman that a man is on his way up.

The foundry yard is a checkerboard of segregation bins of pig iron, scrap, coke and stone that must be taken to the charging floor for weighing and transporting to the cupolas. Instant communication between the charging floor, the foreman's office and these cranes is expected to aid considerably in eliminating idle crane time, in promoting efficiency and in lowering costs.



Two-way extension unit on charging floor is situated so that the foreman can see both cranes



OUT WITH THE OLD: Chambersburg Engineering Co., Chambersburg, Pa., has begun construction of a large iron foundry to replace existing facilities, which have been in operation since 1906. Production is expected to be shifted to the new plant in October of this year, without any schedule interruption. Monthly capacity will be 750 tons, matching the output of the present foundry. Floor space will total 48,000 sq ft plus a separate pattern shop and a yard storage area of 20,000 sq ft

ASTM Publishes Two Lectures

Two books, each containing a lecture presented at the 1954 annual meeting of the American Society for Testing Materials, have been made available by the society. One contains the H. W. Gillett Memorial Lecture, "Fatigue of Aluminum," presented by R. L. Templin, chief engineer of tests, Aluminum Co. of America. The other contains the Edward Marburg Lecture, "Interpretation of Engineering Data: Some Observations," by Harold F. Dodge, quality results engineer, Bell Telephone Laboratories. Copies at $1.50 each are available from ASTM, 1916 Race St., Philadelphia 3.

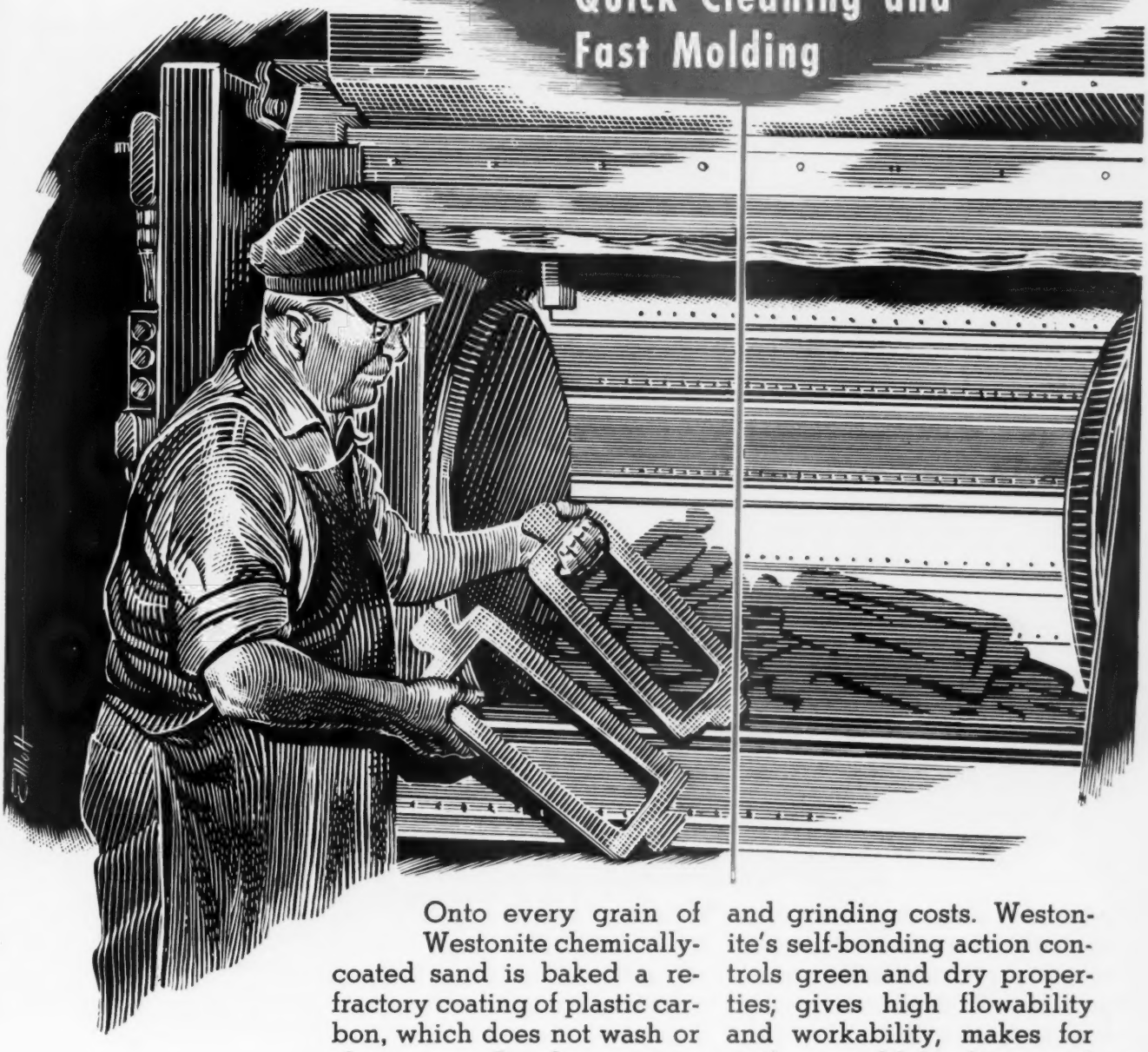
Book Describes Power Tools

New 200-page book, *How to Use Power Tools*, written by Maurice Reid, describes all types of standard portable electric tools, newly developed machines and numerous attachments for specialized jobs. The book has been designed as a manual for the building trades, maintenance crews, industrial production, wood and metalworking shops. Step-by-step instructions and 180 illustrations make this a practical basic guide for all manual workers. Library edition is published by Thomas Y. Crowell Co., New York, at $2.95. Unabridged special editions are available at $1.50 from Porter-Cable Co., 55 Exchange St., Syracuse 8, N. Y.

FOUNDRYMEN!

"Go Westonite"

for Smooth Casting Surface, Quick Cleaning and Fast Molding



Onto every grain of Westonite chemically-coated sand is baked a refractory coating of plastic carbon, which does not wash or chip away. Result: no more burn-in, cleaner and smoother castings, lower cleaning and grinding costs. Westonite's self-bonding action controls green and dry properties; gives high flowability and workability, makes for uniform mold hardness and exact pattern reproduction; speeds up molding.

Write for factual literature

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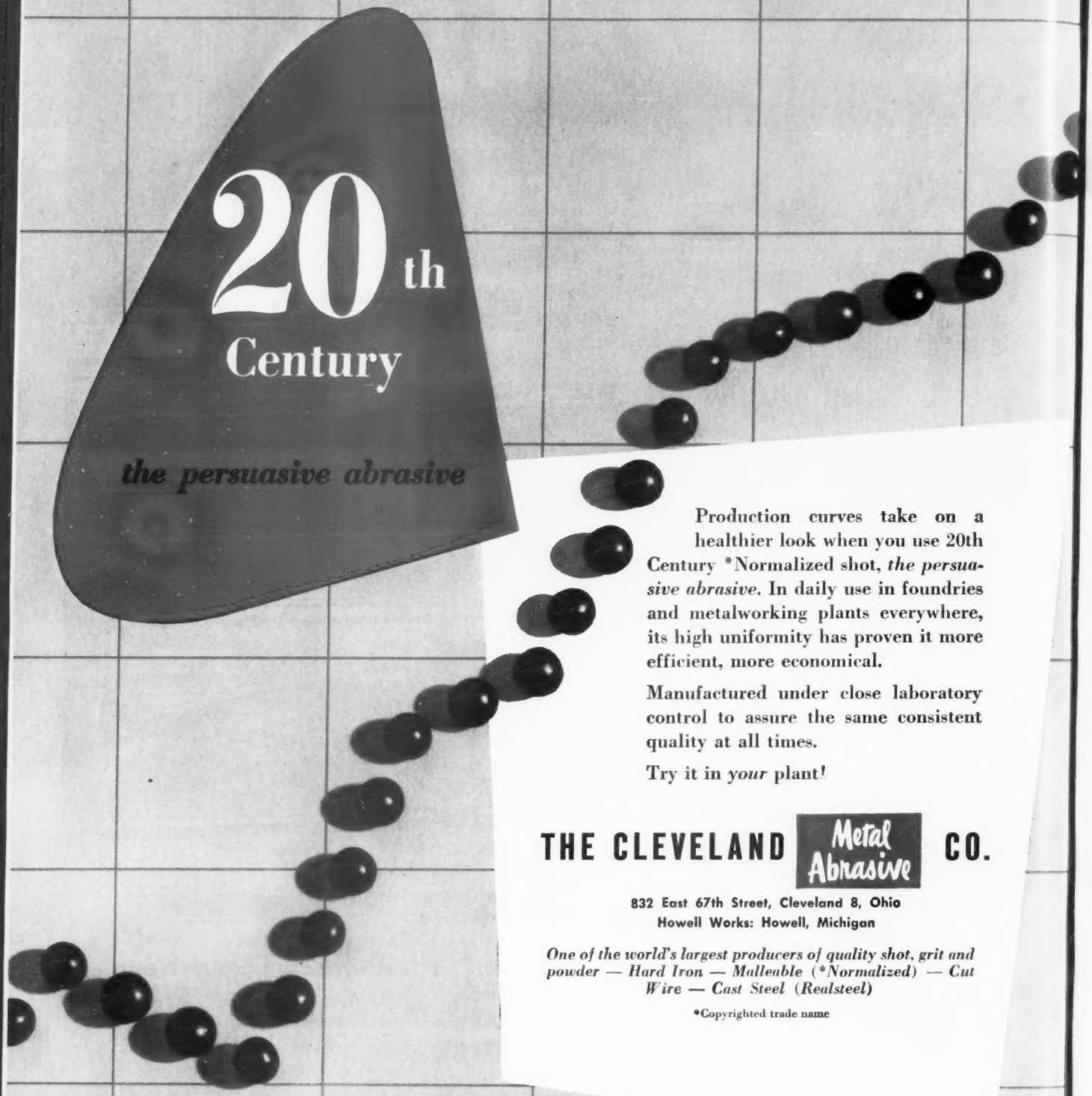

Production curves take on a healthier look when you use 20th Century *Normalized shot, *the persuasive abrasive.* In daily use in foundries and metalworking plants everywhere, its high uniformity has proven it more efficient, more economical.

Manufactured under close laboratory control to assure the same consistent quality at all times.

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*One of the world's largest producers of quality shot, grit and powder — Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Realsteel)*

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Foundry Statistics

MALLEABLE IRON

(Shipments of castings—net tons[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1953	970,506	578,749	.....
1954			
Feb.	69,078	37,792	81,579
2 mo.	139,366	76,058	.....
Mar.	84,342	47,125	74,219
Apr.	74,515	39,102	69,094
May	67,856	37,306	67,040
June	72,820	41,121	60,163
July	50,893	25,243	63,711
Aug.	59,259	34,528	62,494
Sept.	58,015	33,929	66,742
Oct.	64,321	36,956	71,090
Nov.	70,030	41,609	80,686
Dec.	80,599	49,005	85,064
Total	812,016	461,982	.....
1955			
Jan.	82,028	48,000	99,817
Feb.	85,979	48,721	101,766
2 mo.	168,007	96,721	.....

ALUMINUM

(Shipments of castings—1000 pounds)

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1953	658,022	214,553	200,025	239,330	.....
1954					
Feb.	51,213	14,696	17,281	18,754	96,011
2 mo.	102,659	29,394	33,896	38,463	.....
Mar.	56,184	14,468	19,576	21,645	93,407
Apr.	53,006	14,073	18,091	20,366	91,853
May	47,663	12,461	16,312	18,368	83,848
June	48,061	12,442	17,105	17,886	79,126
July	39,636	11,299	13,749	14,004	76,513
Aug.	42,429	11,252	15,335	15,213	76,684
Sept.	46,249	10,717	16,641	18,228	79,873
Oct.	53,901	12,765	19,238	21,245	88,518
Nov.	55,224	12,934	20,396	21,296	94,491
Dec.	64,045	13,753	23,629	26,017	99,556
Total	609,057	155,558	213,968	232,731	.....
1955					
Jan.	64,414	13,358	23,679	26,819	102,382
Feb.	65,519	13,579	22,969	28,234	108,939
2 mo.	129,933	26,937	46,648	55,053	.....

COPPER-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments			Unfilled Orders[2]
	Total	Sand	Perm. Mold	
1953	990,496	888,369	61,316	.....
1954				
Feb.	68,849	60,913	4,743	21,943
2 mo.	140,286	123,947	9,361	.....
Mar.	76,480	67,952	5,123	38,417
Apr.	72,900	65,418	4,732	34,111
May	67,859	61,469	3,755	31,568
June	70,777	64,328	3,567	30,743
July	56,380	51,070	3,073	30,872
Aug.	68,891	63,389	3,547	28,883
Sept.	68,267	62,152	3,637	31,087
Oct.	70,276	63,855	3,619	30,296
Nov.	70,020	63,065	4,089	27,508
Dec.	72,421	65,159	4,346	31,954
Total	834,557	751,804	48,849	.....
1955				
Jan.	72,233	64,540	4,678	30,864
Feb.	75,253	67,768	4,598	37,520
2 mo.	147,486	132,308	9,276	.....

MAGNESIUM

(Shipments of castings—1000 pounds[1])

	Shipments		Unfilled Orders[2]
	Total	For Sale	
1953	34,517	31,469	.....
1954			
Feb.	2,194	1,945	8,315
2 mo.	4,645	4,094	....
Mar.	2,407	2,109	7,698
Apr.	2,068	1,857	7,358
May	1,738	1,541	7,522
June	2,034	1,820	8,296
July	1,924	1,712	8,073
Aug.	2,157	1,944	7,795
Sept.	2,059	1,855	7,474
Oct.	2,092	1,876	7,294
Nov.	2,161	1,906	6,867
Dec.	2,287	2,031	6,678
Total	25,572	22,745	.....
1955			
Jan.	2,305	2,067	7,236
Feb.	2,160	2,009	7,376
2 mo.	4,465	4,076	....

PRODUCTION WORKERS

Estimated Number

(Thousands)

	Feb. 1955	Jan. 1955	Feb. 1954
Ferrous	200,000	194,200	196,400
Nonferrous	65,500	64,200	65,100

Average Weekly Earnings

Gray Iron	$1.73	78.36	71.61
Malleable Iron	82.76	79.79	70.11
Steel	83.85	79.79	77.81
Nonferrous	84.66	84.03	80.20

Average Weekly Hours

Gray Iron	41.7	40.6	38.5
Malleable Iron	41.8	40.5	36.9
Steel	40.9	39.5	39.3
Nonferrous	40.7	40.4	40.1

Labor Turnover Rate (February)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	6.0	3.1	1.6	0.8
Malleable Iron	6.6	2.6	1.3	0.2
Steel	3.9	1.7	0.8	0.5
Nonferrous	4.5	2.7	1.4	0.8

Source: Bureau of Labor Statistics

GRAY IRON CASTINGS—SHIPMENTS (Net Tons[1])

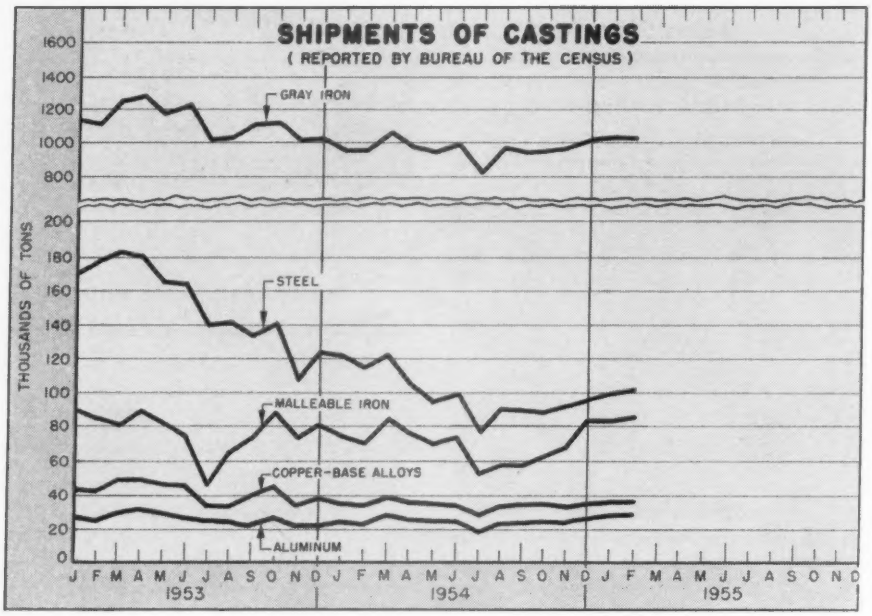
	All Castings		Miscellaneous Castings		Heavy Steel Ingot Molds		Chilled Railroad Car Wheels	Pressure Pipe & Fittings	Soil Pipe & Fittings	Unfilled Orders[3]
	Total	For Sale	Total	For Sale	Total	For Sale	Total	Total[3]	Total[3]	
1953	13,707,902	7,494,843	8,449,837	3,675,454	2,829,159	1,389,483	467,142	1,285,598	677,166	.....
1954										
Feb.	936,364	491,983	607,085	252,591	156,933	70,261	29,240	92,546	50,560	865,344
2 mo.	1,868,662	980,480	1,214,840	513,755	311,292	131,208	60,556	183,444	98,530	.....
Mar.	1,046,779	553,358	684,272	282,328	153,366	65,950	34,240	113,016	61,895	842,499
Apr.	995,052	528,027	657,126	263,147	126,083	56,114	29,075	116,420	66,348	826,491
May	943,335	516,475	605,385	247,623	122,839	57,106	27,144	122,514	65,453	775,278
June	986,810	556,047	616,317	261,133	141,712	70,060	30,883	130,503	67,395	803,570
July	821,151	449,621	510,173	209,294	131,180	62,681	22,902	98,810	59,086	828,924
Aug.	934,644	541,904	569,790	250,702	140,165	69,897	29,134	127,255	68,300	829,505
Sept.	921,232	533,909	559,934	248,124	139,679	68,053	25,374	124,821	71,424	810,654
Oct.	942,934	552,022	570,365	253,802	150,282	79,191	23,599	130,326	68,362	789,117
Nov.	997,301	547,447	623,390	258,933	167,983	85,703	25,723	118,480	61,725	759,613
Dec.	1,074,258	563,699	680,700	276,045	200,044	97,936	27,229	111,082	55,203	744,633
Total	11,532,158	6,322,989	7,292,292	3,064,886	1,784,625	843,899	325,859	1,376,671	743,721	.....
1955										
Jan.	1,091,923	563,153	712,097	282,386	192,132	97,007	25,783	100,638	61,273	782,656
Feb.	1,106,165	578,171	725,154	296,525	196,118	99,794	27,401	90,435	67,057	852,168
2 mo.	2,198,088	1,141,324	1,437,251	578,911	388,250	197,801	53,184	191,073	128,330	.....

STEEL CASTINGS—SHIPMENTS (Net Tons[1])

	All Castings			Carbon			Alloy			Unfilled Orders[3]
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	
1953	1,834,197	1,400,013	321,010	1,276,729	959,493	293,491	557,468	417,148	27,519	.....
1954										
Feb.	116,520	88,699	17,938	81,433	60,810	15,961	35,087	28,061	1,967	234,634
2 mo.	239,278	182,276	38,135	165,360	124,526	35,196	73,918	58,889	3,757	.....
Mar.	122,310	92,271	15,684	85,211	63,137	14,190	37,099	29,316	1,494	214,367
Apr.	105,788	78,754	11,031	72,118	52,652	9,538	33,670	26,365	1,493	197,857
May	94,610	70,596	9,454	64,546	46,768	8,342	30,064	22,945	1,112	182,502
June	100,022	72,881	8,639	69,021	48,370	7,552	31,001	24,554	1,087	169,594
July	75,848	53,207	5,815	50,453	33,461	4,964	25,395	19,746	851	170,567
Aug.	89,590	66,792	9,844	61,344	44,236	8,148	28,256	22,556	1,196	168,303
Sept.	88,359	64,722	8,668	59,039	41,735	7,690	29,320	22,987	978	158,823
Oct.	87,085	64,004	8,580	56,705	39,872	7,596	30,380	24,132	984	154,079
Nov.	87,659	64,812	7,742	56,057	40,085	6,624	31,602	24,727	1,118	175,715
Dec.	93,547	69,843	12,489	62,967	45,632	10,469	30,841	24,211	1,020	179,148
Total	1,184,096	880,158	135,581	802,821	580,474	120,309	381,285	303,428	15,090	.....
1955										
Jan.	98,238	75,044	13,809	67,397	49,816	12,762	30,841	25,228	1,047	201,839
Feb.	106,430	80,729	16,501	74,709	55,014	15,381	28,945	25,715	1,120	202,301
2 mo.	204,668	155,773	30,310	142,106	104,830	28,143	59,786	50,943	2,167	.....

[1]Source: Bureau of Census. [2]For sale only. [3]All cast iron pipe is shipped for sale.

FOUNDRY STATISTICS



COMMERCIAL HEAT TREATING

(National Billings of Metal Institute Members)

	1952		1953		1954	
	No. Reporting	Total Reported	No. Reporting	Total Reported	No. Reporting	Total Reported
July	56	$2,253,346	58	$2,522,651	61	$1,722,449
Aug.	57	2,287,135	60	2,452,186	62	1,801,659
Sept.	57	2,498,544	57	2,522,127	64	1,853,665
Oct.	57	2,837,574	59	2,782,219	62	1,916,504
Nov.	53	2,321,932	59	2,493,497	60	1,966,333
Dec.	52	2,431,975	57	2,219,406	62	2,099,847
Annual total		30,875,924		31,733,067		24,244,368

COKE PRODUCTION AND CONSUMPTION

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1953	78,467,806	78,227,414	2,915,42
1954			
Feb.	4,889,717	4,920,651	211,11
2 mo.	10,702,143	10,559,768	435,41
Mar.	5,146,189	5,177,765	228,13
Apr.	4,693,036	4,569,843	212,27
May	4,802,245	4,656,950	204,95
June	4,640,064	4,683,726	194,66
July	4,618,665	4,555,701	170,61
Aug.	4,510,603	4,501,477	195,34
Sept.	4,490,603	4,434,650	191,60
Oct.	5,082,374	5,100,135	208,41
Nov.	5,230,237	5,283,916	221,39
Dec.	5,610,564	5,615,228	217,10
Total	59,526,723	59,139,159	2,479,92
1955			
Jan.	5,805,926	5,862,113	234,78
Feb.	5,395,936	5,521,668	242,30
2 mo.	11,201,862	11,383,781	477,08

INGOT BRASS AND BRONZE

(Shipments in net tons)

	1954	1955
Jan.	20,661	25,201
Feb.	19,920	25,349
Mar.	23,653	29,713
Apr.	24,746	.....
May	22,269	.....
June	22,348	.....
July	17,074	.....
Aug.	21,684	.....
Sept.	22,464	.....
Oct.	24,080	.....
Nov.	23,061	.....
Dec.	21,273	.....
Total for year	263,233	25,201

ZINC-BASE ALLOY

(Shipments of castings—1000 pounds[1])

	Shipments Total	Shipments For Sale	Unfilled Orders[2]
1953	521,253	349,022	.....
1954			
Feb.	37,660	24,112	55,351
2 mo.	96,246	59,584	.....
Mar.	42,991	28,828	52,544
Apr.	38,968	25,211	51,388
May	36,793	23,671	46,726
June	40,708	26,890	47,537
July	28,306	18,605	43,231
Aug.	34,639	24,898	46,288
Sept.	36,594	25,617	56,006
Oct.	39,072	27,337	64,500
Nov.	48,437	35,207	62,750
Dec.	54,410	35,211	69,403
Total	434,785	295,587	.....
1955			
Jan.	58,586	35,472	70,691
Feb.	58,585	35,893	70,691
2 mo.	117,171	71,365	73,558

INDEX OF FOUNDRY EQUIPMENT ORDERS

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1954	1955
Jan.	173.8	81.0
Feb.	99.9	90.4
Mar.	82.7	....
Apr.	125.3	....
May	80.8	....
June	86.4	....
July	68.8	....
Aug.	75.6	....
Sept.	68.3	....
Oct.	147.5	....
Nov.	61.4	....
Dec.	113.9	....

Note: Figures are percentages of the base period 1947-49 taken as 100 per cent (monthly average). This is a new base period. Source: Foundry Equipment Manufacturers Association.

IRON AND STEEL SCRAP CONSUMPTION

(Gross tons*)

	All Scrap Total	By Types of Furnace: Cupola Total	Air Total	Electric Total
1953	69,005,976	9,676,463	1,026,334	8,263,880
1954				
Jan.	4,574,384	711,335	71,202	505,536
Feb.	4,385,340	704,535	67,263	462,095
Mar.	4,637,573	783,529	82,337	517,702
Apr.	4,582,862	748,766	79,183	518,048
May	4,776,603	710,159	67,368	506,582
June	4,664,561	725,910	75,306	515,019
July	3,909,336	565,275	45,920	420,564
Aug.	4,164,703	671,631	65,336	486,596
Sept.	4,298,495	675,593	68,860	500,349
Oct.	4,782,488	710,127	67,678	528,432
Nov.	4,928,850	737,286	71,844	573,298
Dec.	5,075,563	798,435	92,910	566,223
Total	54,780,758	8,542,581	855,207	6,100,444
1955				
Jan.	5,416,052	813,682	90,622	614,824

PIG IRON PRODUCTION AND CONSUMPTION

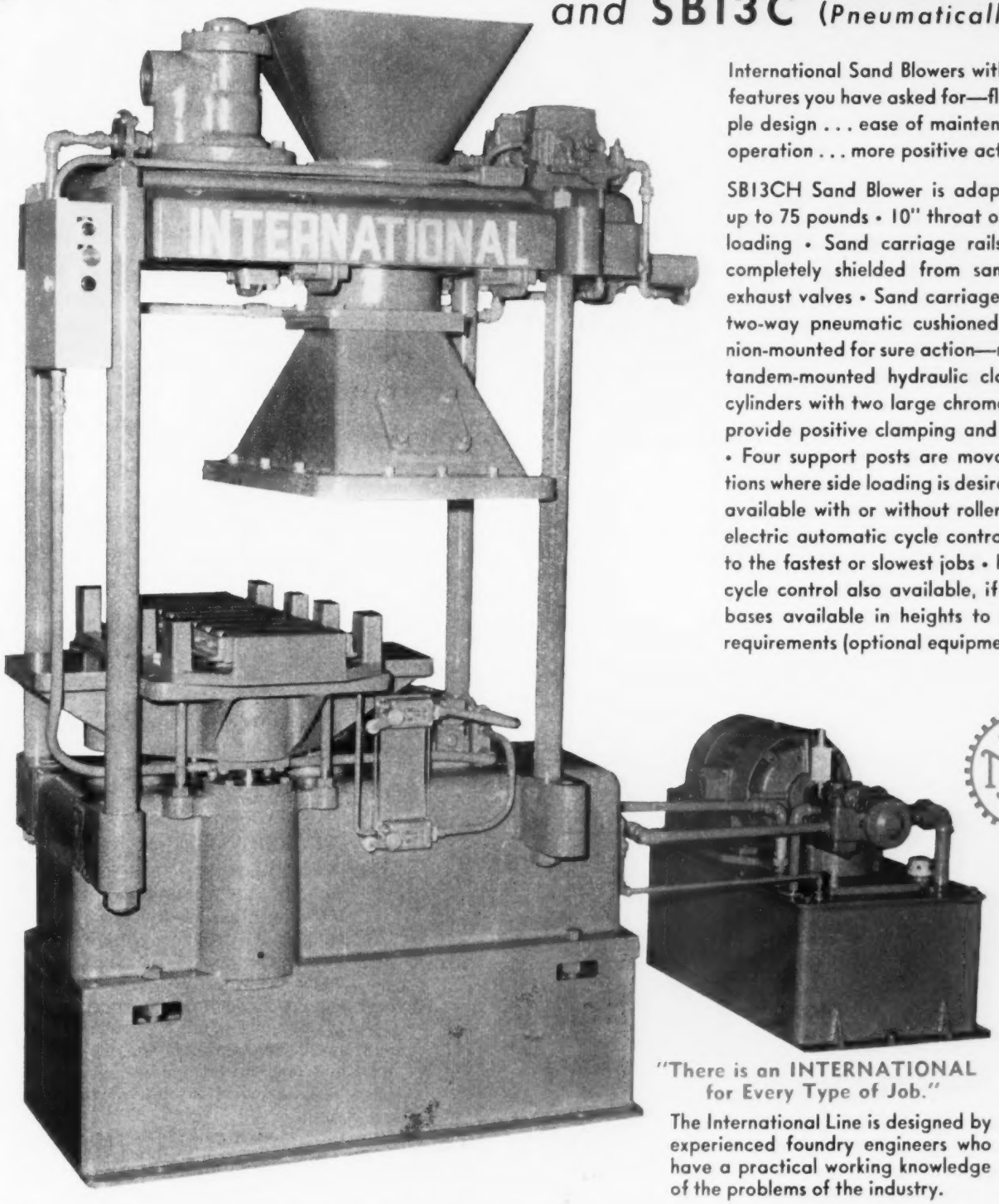
	Production** (standard grades—net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace—gross tons) Total	Cupola	Air	Electric
1953	74,879,511	2,599,307	3,736,431	60,465,016	8,347,825	66,637,364	4,918,480	272,311	164,267
1954									
Mar.	4,907,147	213,249	243,356	3,977,137	473,405	4,367,814	390,929	21,369	13,112
3 mo.	15,202,897	554,056	810,754	12,399,677	1,438,410	13,595,038	1,105,329	56,246	37,582
Apr.	4,449,289	155,249	256,662	3,630,901	406,477	4,021,957	375,045	26,553	10,497
May	4,572,252	154,768	231,479	3,741,671	444,334	4,188,269	367,437	16,453	16,531
June	4,683,629	175,759	200,154	3,853,444	454,272	4,297,531	375,601	18,545	14,196
July	4,590,076	182,130	182,527	3,790,999	434,420	3,990,431	293,926	12,258	13,317
Aug.	4,529,291	186,097	165,891	3,722,094	455,209	4,013,552	354,067	15,926	10,325
Sept.	4,417,888	188,599	179,629	3,622,799	426,861	4,005,578	346,698	16,984	11,654
Oct.	4,937,436	212,237	248,643	3,979,437	497,119	4,518,770	367,063	16,186	11,307
Nov.	5,204,446	202,824	263,484	4,233,253	504,885	4,764,215	375,526	16,178	15,932
Dec.	5,526,720	229,717	259,423	4,510,772	526,808	4,978,200	403,726	19,829	13,917
Total	58,113,924	2,241,436	2,798,646	47,485,047	5,587,465	52,373,541	4,364,418	215,158	155,258
1955									
Jan.	5,729,404	243,608	272,451	4,703,875	509,470	5,202,360	409,281	18,874	20,016
Feb.	5,394,585	209,852	252,860	4,425,080	506,793	.....	.....	.....	.....
Mar.	6,406,902	221,437	359,413	5,239,116	586,936	.....	.....	.....	.....
3 mo.	17,530,891	674,897	884,724	14,368,071	1,603,199	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only.

UNDRYMEN—here are the Sand Blowers you asked for . . .

INTERNATIONAL'S *New* SB13CH

and SB13C (*Pneumatically operated*



International Sand Blowers with all of the new features you have asked for—flexibility . . . simple design . . . ease of maintenance . . . faster operation . . . more positive action!

SB13CH Sand Blower is adaptable for cores up to 75 pounds • 10" throat opening for easy loading • Sand carriage rails and bearings completely shielded from sand • New-type exhaust valves • Sand carriage operated by a two-way pneumatic cushioned cylinder, trunnion-mounted for sure action—no springs • Two tandem-mounted hydraulic clamp and draw cylinders with two large chrome-plated guides provide positive clamping and accurate draw • Four support posts are movable for operations where side loading is desired • Draw table available with or without rollers • Completely electric automatic cycle control can be timed to the fastest or slowest jobs • Hand operated cycle control also available, if desired • Subbases available in heights to meet conveyor requirements (optional equipment).

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INTERNATIONAL MOLDING MACHINE CO.

LA GRANGE PARK, ILLINOIS

New Equipment and Supplies

Car Shaker: Simplicity Engineering Co., Durand, Mich.—Car shaker is designed to fit any size gondola and is said to reduce the effort and time required to unload drop bottom gondola cars. Unit is 4 ft high, 5 ft wide and 11 ft 1 in. long and weighs 9500 lb. Construction is all welded and stress relieved; motor is enclosed and mounted on resilient rubber to reduce vibration. It is balanced for easy handling by overhead crane or hoist.

For More Details Circle No. 1—Page 187

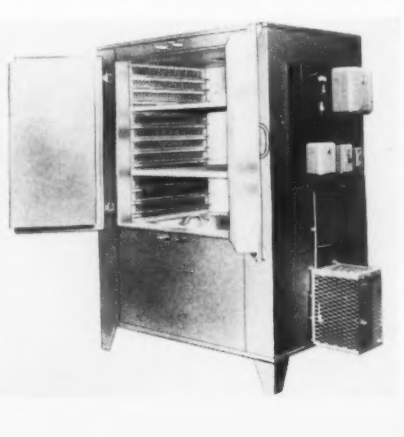
Casting Impregnator: Wayne Chemical Products Co., 9502 Copeland St., Detroit 17, Mich.—Silicated compound which contains oxides and pigments is said to seal porosity in cast iron, aluminum, bronze and other metals. It is impregnated under pressure into pores and small leaks while parts are at a temperature from 160 to 180° F by circulating the solution through the parts. The solution may be thinned with water.

For More Details Circle No. 2—Page 187

Metal Reclaiming Mill: Dreisbach Engineering Corp., 83-85 Warburton Ave., Yonkers 2, N. Y.—Dry process metal reclaiming mill reclaims metallics from aluminum and magnesium skimmings and dross and also from some types of ore. It employs herringbone corrugation crushing rolls of cast manganese steel. Pulverized waste is removed pneumatically. Metallics are separated from the middlings, and tailings are carried into a dust collector while metallics concentrate in the drum. For automatic continuous operation control, a time regulator is used to stop the feed and discharge the metal at intervals by lowering the charging hopper with air or by hydraulic operation. Timing of this cycle is based on the percentage of metal content in the feed material. The design is adaptable for production of any tonnage.

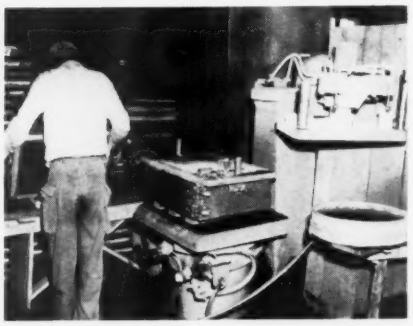
For More Details Circle No. 3—Page 187

Industrial Ovens: Carl Mayer Corp., 3030 Euclid Ave., Cleveland 15, O.—New portable industrial ovens for use in closely controlled production and laboratory work are available with either horizontal or vertical air flow. Specially designed for temperature uniformity, the ovens employ a high-pressure, motor-driven blower to propel heated air in a definite air-flow pattern through the work chamber. This feature is said to prevent disturbance due to radiant heat and to assure temperature uniformity. Other features include no metal-to-metal contact, high and low heat switch for close control and quick recovery, electrical interlock for turnoff of heat in event of blower motor failure and Inconel-sheathed heating elements. An indicating temperature control is standard equipment, and other control instruments are available optionally.



For More Details Circle No. 4—Page 187

Jolt Squeezer: Beardsley & Piper, Division Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39, Ill.—Swinghead jolt squeezer has a 6-in. jolt cylinder and a 16-in. squeeze cylinder and can be changed from right to left hand operation by a single adjustment. Dual



safety squeeze controls and knee valve jolt control are said to make the machine fast and safe. Table is 20 x 25 in., and the vertical opening between table and squeeze head is 20 in. Capacity is 940 lb.

For More Details Circle No. 5—Page 187

Mold Sprays: Frederic B. Stevens Inc., 1800 18th St., Detroit 16, Mich.—Three fast-drying sprays can be mixed with conventional mold coatings to provide a spray coating which permits accelerated drying. One spray is said to be suited for flame igniting, one to permit speeded-up drying through use of a torch, and one can be ignited and also can be used where fast air drying is desired.

For More Details Circle No. 6—Page 187

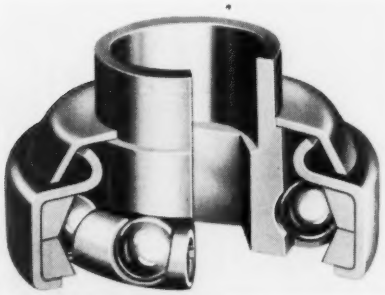
Power Sweeper: Modern Power Sweeper Co., 738 North McKeever Ave., Azusa, Calif.—Industrial power sweeper reportedly will clean 45,000 sq ft per hr. Sweeper features a power reverse, 16 brushes

For More Details on These Items
Use Reply Card—Page 187

on the main broom, 3.6-hp engine, heavy - duty semipneumatic front casters with 1-in.-diam stem, main broom height control to steering bar and side brush height control on the steering bar. Models are available in three sizes.

For More Details Circle No. 7—Page 187

Conveyor Bearing: Logan Co., Louisville 6, Ky.—Low-friction type ball bearing for conveyor rolls is patterned after precision bearings and



has been made standard on 90 per cent of conveyor bearings. In the new bearing, the balls are separated by a one-piece retainer which requires no rivets. The new type is interchangeable with the former and has the same capacity. When the low-friction bearing is used, less grade is required on gravity lines, and the manual effort required has been reduced correspondingly on level push lines.

For More Details Circle No. 8—Page 187

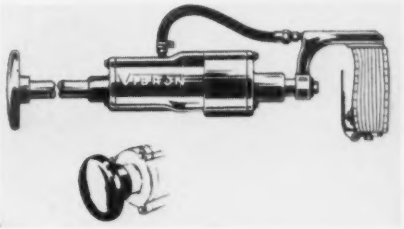
Iron Ingot: Hanna Furnace Corp., Merchant Pig Iron Division, Walbridge Bldg., Buffalo, N. Y.—Rectangular-shaped iron ingots are for users of 10 lb ingots and are said to provide easier handling. Size is 5¾ x 6½ x 1⅜ in. Manufacturer states that the new size makes charging by count easier with less breakage because of reduced size. Fine-grain structure and no free-carbon pockets reportedly make melting more even and control more accurate. Standard 38-lb pigs also can be supplied.

For More Details Circle No. 9—Page 187

Utility Crane: Link Belt Speeder Corp., Cedar Rapids, Iowa—Self-propelled, one-man operated, rubber-tired utility crane with power hydraulic control has been added to the firm's line. Specially designed for mobile work, it travels at speeds up to 7 mph and works equally well with crane, clamshell, dragline, lifting magnet, shovel or hoe attachments. Lifting capacity is 15 tons. An independent rapid boom hoist provides power controlled raising and lowering of the boom. Booming up is friction clutch driven, and booming down is controlled mechanically by a ratchet and pawl mechanism against engine compression. A boom hoist lowering clutch is available for precision control. Work speeding optional features include reversing clutches for either or both main drums and independent swing and travel. Clutches are self-compensating for heat and normal lining wear, and all, except the shovel retract clutch, are interchangeable. The crane is powered by a gasoline engine equipped with a torque converter.

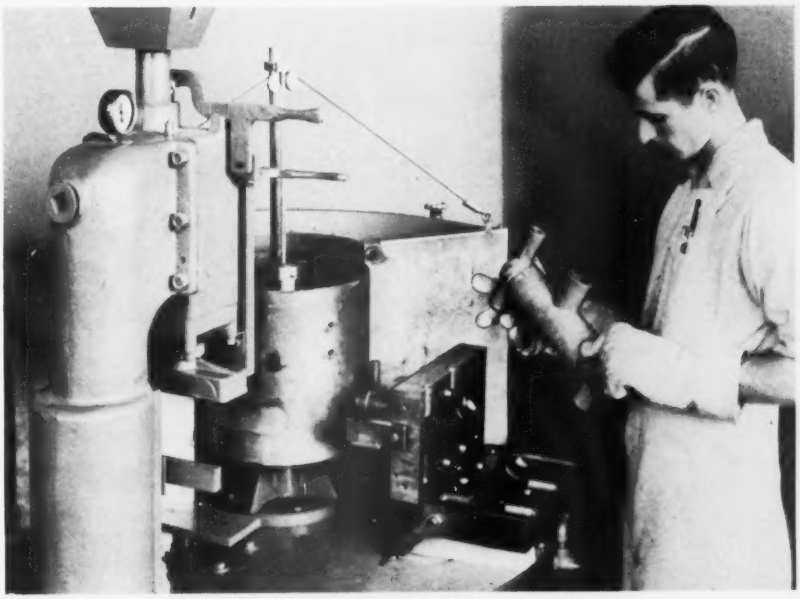
For More Details Circle No. 10—Page 187

Refractory Rammer: Burgess-Sterbentz Corp., Vibron Division, 3790 West 150th St., Cleveland 11, O.



—Pneumatic rammer is reported to cut downtime for the application and patching of refractories. It is said to deliver a controlled, powerful stroke which eliminates recoil shock and vibration. The unit has twin rubber grip handles, a bronze-lined aluminum alloy body and a hard chrome piston. The rear grip handle can be rotated on its mounting for better positioning of the rammer and greater ease of operation. The front grip houses the trigger and is located under the center of balance for one-hand operation. The unit operates

Shell Coreblower Makes 120 Cycles Per Hour



SHELL coreblower requires only gas for curing oven and compressed air. Reportedly it can be operated at 120 cycles per hour by an unskilled operator. There are no electric heaters in coreboxes or corebox holding fixture. While machine is designed for high-speed production using two coreboxes, one box can be used without complications. When two boxes are used, one shell core is curing in the oven while another core is being blown, removed and the corebox is being drained at the other station.

Different cores can be made at same time if corebox measurements are similar. One model can accommodate coreboxes up to 6 x 9¾ x 11 in. and can produce up to 10-lb cores per blow at each station. Machine is manufactured by Shell Process Inc., 347 McKinstry Ave., Chicopee, Mass.

For More Details Circle No. 11—Page 187

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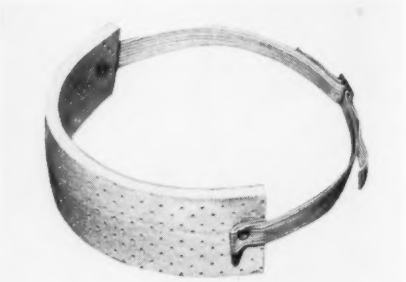
at usual shop air pressure, and a quick-connect coupling permits simple and rapid connection of the ¼-in. air supply line. Normal ramming head is 3 in. in diam, but shafts of varying lengths and heads of other diameters are available.

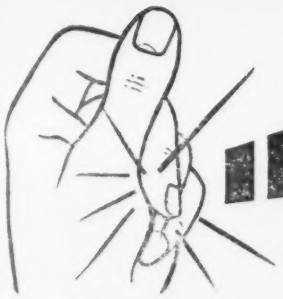
For More Details Circle No. 12—Page 187

Sweatbands: Pulmosan Safety Equipment Corp., 644 Pacific St., Brooklyn 17, N. Y.—Sweatbands are made of perforated pure foam rubber reinforced with cotton backing. Perforations assertedly aid evaporation of water and circulation of air. Elastic headbands are adjustable. Manufacturer claims the foam rubber body is durable, tear resistant, soft and resilient.



For More Details Circle No. 13—Page 187

Handling Baskets: Chas. Wm. Doepke Mfg. Co., 8839 Blue Ash Rd., Rossmoyne, O.—New line of perforated, stainless steel baskets is said to combine strength and rigidity of the firm's standard sheet steel box with rapid draining and easy cleaning features. Design of the basket permits handling parts throughout all production operations in the same container. When filled, the baskets tier in rigid stacks with contents of each unit visible and accessible through double hopper ends. Empty baskets nest. Available in five different sizes ranging from 12 to 36 in. long, the units can be sup-



IDEAS FOR FOUNDRYMEN

HERE ARE QUICK REVIEWS OF NEW LITERATURE—available to foundrymen as "idea" and reference information. Readers in the United States and Canada may obtain copies by using the attached cards. Readers in foreign countries should write direct to the manufacturer offering literature.

81. Conveyor System

Westover Engineers, 3110 West Fond Du Lac Ave., Milwaukee 10, Wis.—Bulletin describes mold conveyor system that features roller-equipped bottom boards or pallets and track. Rollers ride on twin rows of ball bearings on rails of bar construction designed to eliminate accumulation of dirt. Rounded edge rails are cleaned by passage of roller over the rail. Milled ends of rails are said to assure close joints to provide smooth mold movement. Rollers are shielded from sand and molten metal.

82. Ramming Mixes

Kaiser Chemicals Division, Kaiser Aluminum & Chemical Sales Inc., 1924 Broadway, Oakland 12, Calif.—Booklet presents information on use of company's ramming mixes for open hearth and electric steel furnaces. Detailed instructions for building forms, mixing the basic refractory materials and ramming them is included.

83. Accident Prevention

W. H. Brady Co., 727 West Glendale Ave., Milwaukee 12, Wis.—Full color, 16-page bulletin 145-C covers company's line of self-sticking basic purpose and specific purpose accident prevention signs that can be used alone or in combination with each other or with other signs to apply vital safety warnings at the point of the hazard.

84. Carbide Tools

Allegheny Ludlum Steel Corp., Carmet Division, Detroit 20, Mich.—Eighth edition of carbide metal tools methods manual covers tool design, brazing, grinding, chip breakers, coolants, hints on set-up, reference data, table of cutting speeds and recommendations on grades, feeds, cuts and speeds for steel cutting, ferrous castings, nonferrous metals and nonmetallics. Common terminology used in metalworking is summarized and illustrated with drawings.

85. Fume Control

American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka, Ind.—Bulletin 553-D presents four case histories showing typical metalworking plants using cloth tube-type collectors to trap electric steel melting furnace fume before it escapes to atmosphere. A discussion of the air volumes employed at the companies and the synthetic filtration fabrics used to withstand high temperatures is included.

86. Lifting Magnets

Cutler-Hammer Inc., 315 North 12th St., Milwaukee 1, Wis.—Booklet EC-88 describes the construction and applications of line of electromagnets, including latest all-welded types. Magnets in all sizes to perform a variety of metal handling jobs in foundries, scrap yards, steel mills or other applications are illustrated.

87. Portable Pyrometer

Illinois Testing Laboratories Inc., 420 North La Salle St., Chicago 10, Ill.—Portable pyrometer with enclosed, protected thermocouple reportedly suited to temperature measurements of molten brass, bronze, copper, aluminum bronze, magnesium alloys and similar metals is described in bulletin 1724-D.

88. Control Systems

Automatic Temperature Control Co. Inc., 5200 Pulaski Ave., Philadelphia 44, Pa.—Case histories and descriptions of company's services in the design, purchasing, construction and start-up of packaged automatic control systems is described in bulletin S-10. Electronic, hydraulic,

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pneumatic or electromechanical systems can be engineered to meet most any control need.

89. Plant Layout Equipment

"Visual" Plant Layouts Inc., Pennsylvania Ave. at River, Oakmont (Allegheny Co.), Pa.—Catalog and price list of 3-dimensional models is available upon letterhead request. Catalog lists standard machine tools, incidental shop equipment, office equipment and warehouse equipment. Over 5000 stock models are available to provide experimental layout material for the engineering group planning new plants.

90. Pneumatic Conveyor

Crane Co., 836 South Michigan Ave., Chicago 5, Ill.—Pneumatic pipe line conveying system for transporting sand or other bulk materials is covered in illustrated form AD-1906. System requires a single operator and is available in varying capacities for automatic or semiautomatic operation. Transfer switches deliver material to a series of locations.

91. Metal-Clad Switchgear

General Electric Co., Schenectady 5, N. Y.—Details of design, accessories, applications, installation and maintenance of metal-clad switchgear rated 2.4 to 13.8 kv and 50 to 500 mva are presented in four color, 52-page bulletin GEA-5664C. Tables of weights and dimensions, foundation data and guide form specifications also are included.

92. Industrial Hose

J. N. Fauver Co., 51 West Hancock Ave., Detroit 1, Mich.—Catalog 55 presents descriptions, specifications and engineering data on industrial hose assemblies, couplings, stems, swivels and accessories available in any length, complete with attached couplings, in hose sizes from 3/16 to 2 in. ID.

93. Ductile Iron

International Nickel Co., 67 Wall St., New York 5, N. Y.—Detailed specifications and mechanical property data on ductile iron are contained in bulletin DI-25. To point out the advantages of ductile iron, the bulletin cites those applications and industries in which it has demonstrated superior performance.

94. Material Handling

Edison Storage Battery Division, Thomas A. Edison Inc., West Orange, N. J.—"Modern Material Handling" is a 32-page booklet published for users of electric industrial trucks and intended as an elementary, nontechnical description of the unit-load method of material handling, the power requirements of industrial trucks and the characteristics of nickel-iron-alkaline storage batteries in industrial truck operation.

95. Grinding Expander

Chicago Rubber Co. Inc., 2620 Clybourn Ave., Chicago 14, Ill.—Data sheet presents information on slotted rubber wheel expanders that hold abrasive sleeves by centrifugal force with no possibility of slipping. Wheels are offered in a variety of sizes from ½ to 8-in. diam, with approximate speed ranges from 1800 to 19,000 rpm.

96. Self-Dumping Hoppers

Roura Iron Works, 1401 Woodland Ave., Detroit 11, Mich.—Bulletin 250 covers line of self-dumping hoppers for handling wet or dry, hot or cold bulky materials. Several standard models in capacities from ¼ to 2 yd are available or custom hoppers can be engineered to special requirements.

97. High Alloy Castings

Duraloy Co., Scottdale, Pa.—General bulletin 3354-G details company's facilities for producing high alloy static and centrifugal castings and includes engineering data concerning castings used for resisting high temperatures, corrosion and abrasion.

98. Water Softeners

Permutit Co., 331 West 42nd St., New York 36, N. Y.—Troubles caused by using hard water and the economies effected by curing them are discussed in bulletin 2386-A. Specifications, operating characteristics and typical installation photographs are shown.

99. Portable Muller

National Engineering Co., 646 Machinery Hall Bldg., Chicago 6, Ill.—Bulletin 524 describes versatility of 250 lb capacity portable muller for mixing all types of foundry sand. Case histories of present users are included as well as a table of dimensions and suggestions for use.

100. Cutoff Machines

Tabor Mfg. Co., 6225 Tacony St., Philadelphia 35, Pa.—Illustrated bulletin 535 gives 16 pages of information on abrasive cutoff machines for foundry, metalworking and special applications. Specifications and general data on each machine is included.

101. Coated Abrasives

Armour & Co., Coated Abrasives Division, Alliance, O.—"How to Store Coated Abrasives" describes temperature and humidity limits for proper storage of coated abrasives and suggests an ideal storage room location.

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plied in various types of stainless steel as well as in aluminum or cold rolled steel.

For More Details Circle No. 14—Page 187

Thread Repair Kits: Heli - Coil Corp., Danbury, Conn.—Twenty-six thread repair kits in a variety of

size ranges and each containing a quantity of inserts, tap and inserting tool, are available for general maintenance and repair purposes. Thread inserts are made to provide strong, permanent threads that are resistant to wear, corrosion, seizing and galling in iron and steel as well as aluminum, magnesium, copper, plastics and wood. Three steps are required to repair a thread with an insert: Drill out damaged threads, tap new threads to accommodate the insert and screw in the insert. Sizes range from 6-32 to 1½-6 in. both NF and NC series.

For More Details Circle No. 15—Page 187

Aluminum-Coated Fabric: Minnesota Mining & Mfg. Co., Dept G5-24, 900 Fauquier St., St. Paul 6,

Minn.—Aluminum-coated fabric for use in protective garments for industrial "hot jobs" protects the wearer by reflecting radiant heat instead of insulating against it. The material is flexible and light. In its production, a thin aluminum coating is applied on a light asbestos fabric base. Molten splatter rolls off garments, and

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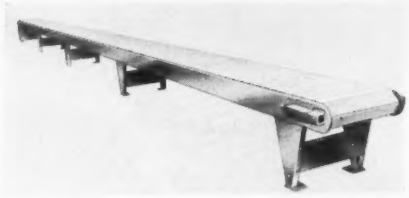
the material is long wearing. Workers are said to accept the material because of the freedom of movement it allows.

For More Details Circle No. 16—Page 187

Metal Belt Conveyor: M-H Standard Co., 515 Communipaw Ave., Jersey City 4, N. J.—Sectional metal belt conveyor is designed to handle packages, boxes, cans, drums, bags and similar containers through horizontal and vertical paths under severe conditions. These units now are available with 6-in. pitch belt links.



The new series is furnished in ten standard widths from 12 to 60 in. wide and incorporates all features of the original 3-in. pitch belts. These features include high tensile strength per pound; ball bearing rollers; guarded moving parts, except the belt surface; tracking without attention; and resistance to damage from water, oil, heat, impact and abrasion.

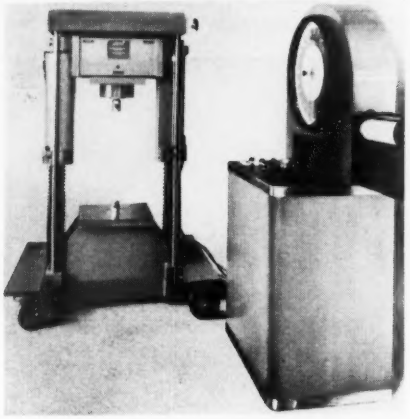
For More Details Circle No. 17—Page 187

Safety Shoes: Record Industrial Co., 3301 Arch St., Philadelphia 4, Pa.—Leather safety shoes have been treated with silicone to

make the leather waterproof yet allow it to breathe. Treatment also is said to stop absorption of chemicals, oils, bleach or other caustics. Shoes have neoprene soles with dacron stitching and are available in either oxford or high styles.

For More Details Circle No. 18—Page 187

Testing Machine: Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.—Portable hydraulic testing machine of 60,000-lb capacity in tension and compression can apply both



tension and compression in a common testing space over a fixed table 24 in. above the floor. A double-acting Emery hydraulic capsule is used in the weighing system, separate and independent of the hydraulic loading system. A standard Tate-Emery null-balance indicator on the control console has three ranges: 0-60,000, 0-12,000 and 0-2400 lb. Loads are applied by two 24-in. stroke double-acting hydraulic cylinders between side columns. The

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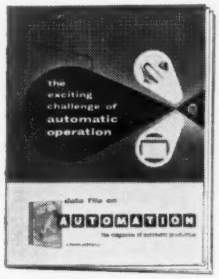

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10-14	Mines	522		44	404	74	
20	Food and Kindred Products	1340	6	210	203	917	4
21	Tobacco Manufacturers	62		10	9	43	
22	Textile Mill Products	965		203	97	664	1
24	Lumber and Wood Products	403		112	66	225	
25	Furniture and Fixtures	181		44	42	95	
26	Paper and Allied Products	734	1	98	126	508	1
27	Printing, Publishing and Allied Industries	179		14	28	134	3
28	Chemicals & Allied Products	1348	9	173	281	884	1
29	Petroleum & Coal Products	427		27	68	332	
30	Rubber Products	211		20	34	157	
31	Leather & Leather Products	213		37	26	150	
32	Stone, Clay & Glass Products	765	1	78	157	529	
33	Primary Metal Industries	1482	6	479	447	545	5
34	Fabricated Metal Products	1547		522	350	672	3
35	Machinery, except Electrical	5187	12	1657	843	2625	50
36	Electrical Machinery, Equipment & Supplies	1950	12	471	381	1056	30
37	Transportation Equipment	1732	26	379	524	791	12
38	Instruments, Optical Goods, Watches & Clocks	605	6	154	116	321	8
39	Miscellaneous Manufacturing Industries	227		41	41	143	2
89	Consulting & Industrial Engineering Firms	937	4	624	6	290	13
	Miscellaneous Industries including Ordnance, Banks, Insurance Companies, Educational, Trade Associations, Libraries, etc.	40	13	9	2	7	9
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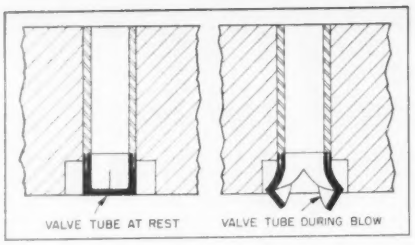
For More Details Circle No. 19—Page 187

Sand Arrester Tube: Martin Engineering Co., Neponset, Ill.—Company has added a valve tip sand arrester tube to its line of blow tubes. The tube is said to be capable of passing sand from the core blower magazine to the corebox at blowing pressure, yet holding dry or fully flowable sands against running out of blow holes on box change or shuttle cycles. Tubes are available in same sizes and lengths as regular patented sand arrester tubes.

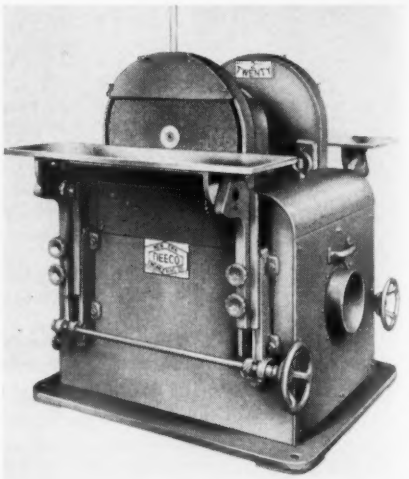


For More Details Circle No. 20—Page 187

Tier-Type Rack: Rack Engineering Co., 133 Sixth St., Connellsville, Pa.—Tier-type storage rack features adjustable horizontal and upright members that permit packing to an almost solid cube, regardless of the shape or weight of the contents, according to the manufacturer. Unit has a base of tubular and channel members, with or without heavy duty casters. Steel stirrups and nesting caps provide safety in stacking. Shelves can be of pressed wood, steel or expanded metal. Four base sizes are made: 36 x 36, 40 x 48, 48 x 48 and 48 x 60 in. Uprights may be 24, 36 and 48 in. high.

For More Details Circle No. 21—Page 187

Disc Grinder: New Era Engineering Co., 458 West 29th St., Chicago 16, Ill.—Twenty-inch-diameter double-disc grinding machine operates at a perimeter speed of 18,000 fpm. Machine is powered by a 10-hp direct-driven motor and can be supplied in 220 or 440-v, 60-cycle models. Manufacturer claims the unit has extreme flexibility in that coarse



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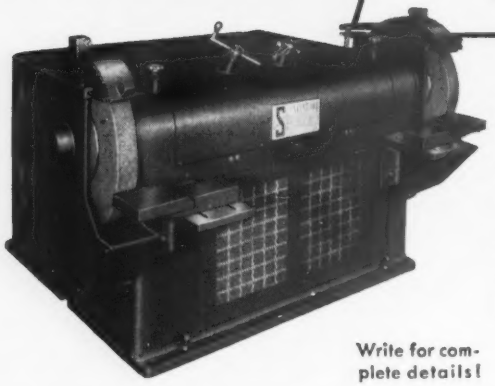

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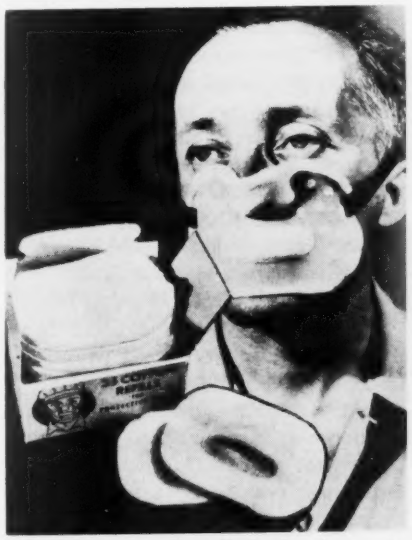
and fine abrasives can be used on the discs to provide fast metal removal and fine finish. As optional equipment the grinder can be supplied with a built-in dust collector.

For More Details Circle No. 22—Page 187

Presses: Hydraulic Press Mfg. Co., Mt. Gilead, O.—Eleven models are included in a line of C-frame type presses ranging in size from 2 to 200 tons capacity. Designed for low-tonnage jobs, the presses are adaptable to applications including assembly work, trimming, marking, compacting, blanking, drawing, broaching, and straightening of castings. Sizes available in the standard line are 2, 5, 10, 15, 25, 35, 50, 75, 100, 150 and 200 ton models.

For More Details Circle No. 23—Page 187

Dust Mask: General Scientific Equipment Co., 2700 West Huntingdon St., Philadelphia 32, Pa.—Feather - light, pliable protective masks weigh less than ½-oz and



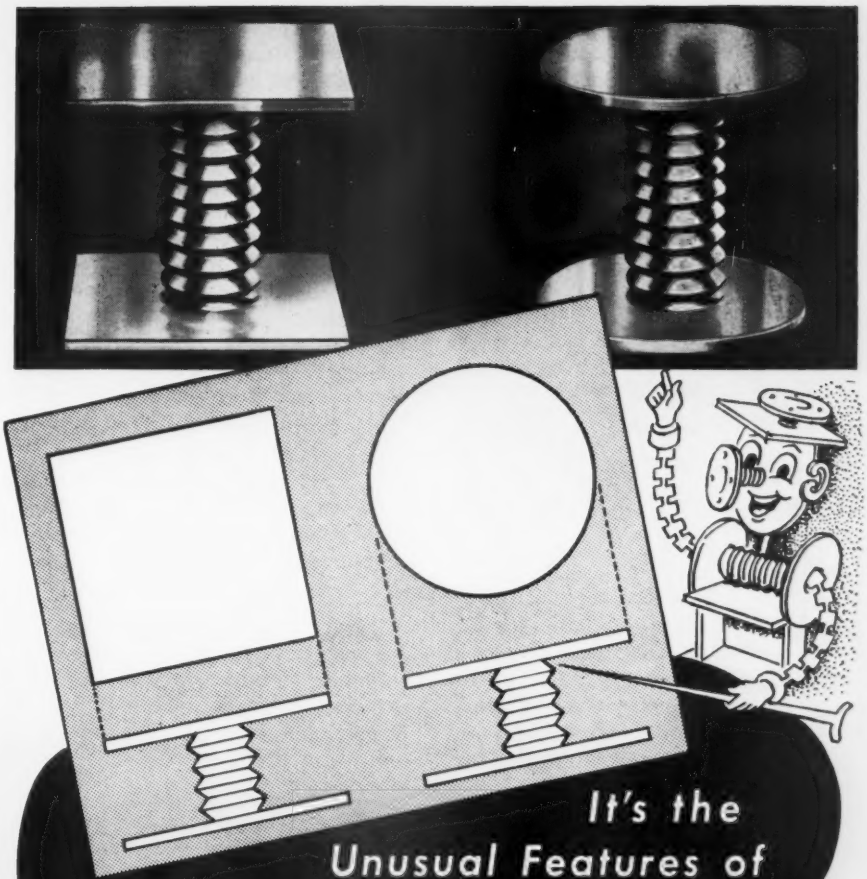
are made of soft rolled aluminum to fit contour of any face. Long staple cotton bonded filter protects against ordinary nontoxic dusts and spray hazards. Mask may be worn with safety goggles. No metal touches the skin.

For More Details Circle No. 24—Page 187

Zip-On Boots: A & A Mfg. Co., 2017 West Clybourn St., Milwaukee 3, Wis.—Sleeves, boots, way-protectors, and machinery covers of all shapes, sizes and contours are made to protect, cover and/or enclose a wide variety of outdoor machinery. Fabricated from weatherproof, neoprene-base materials, the closures permit a degree of flexibility without cracking.

For More Details Circle No. 25—Page 187

Saw Guard: Brett-Guard Co., Division of Glenwood Industries Inc., Englewood, N. J.—Safety guard for circular table saws is said to afford



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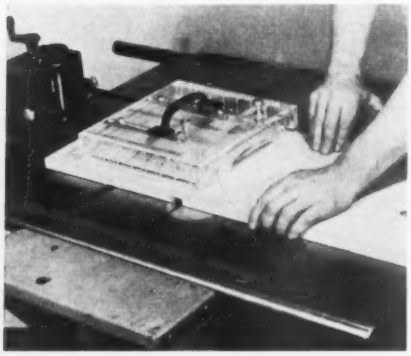


in. thick covers the saw while allowing full vision of the work. A flick of a knob sets the guard into any of three operating positions (in aligned holes) in extension plates attached to the tabletop. The guard itself is capable of providing horizontal and vertical pressure and can be used as an over-riding fence for angular work.

For More Details Circle No. 26—Page 187

Surface Protection: Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill. —New or old galvanized metal surfaces can be coated without need of etching treatment by use of company's formula. Furnished at brush consistency, the material may be applied by brush or spray. Choice of red, gray, metallic or green colors can be supplied.

For More Details Circle No. 27—Page 187

X-ray Crane: Balteau Electric Corp., 5 New St., Stamford, Conn.— Hydraulic crane for handling the "camera" of the firm's 200-kv industrial x-ray unit can serve either as

a stationary mounting or as a mobile crane. X-ray head can be raised to 87 in. or lowered to 24 in. An extension boom is available that widens the range of movement to a low of 14 in. and a high of 101 in. The head may be rotated readily through 360 degrees around either vertical or horizontal axes. Hydraulic control permits precise, fast positioning.

For More Details Circle No. 28—Page 187

Metal Sealer: Prenco Products Inc., 507 East 10 Mile Rd., Hazel Park, Mich.—Metal oxide type cleaner for impregnating all types of metal castings is said to have a short sealing reaction time. Manufacturer reports the seal eliminates microscopic porosity in brass, bronze, gray iron, malleable iron, steel, ductile iron, zinc, aluminum and magnesium sand and die castings which must withstand air, gas, oil or other fluid pressures.

For More Details Circle No. 29—Page 187

Blow Gun: Teglen Engineering Co., 1209 Fair Oaks Ave., South Pasadena, Calif.—Flexible tip blow gun is designed for a wide range of uses wherever hand-controlled com-

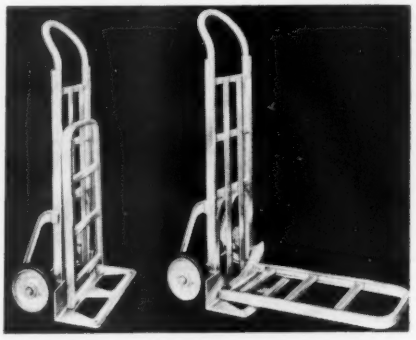
pressed air hoses are used. Controlled by manual flexing of the nozzle, it is said to be easily manipulated to produce any amount of air. Until the gun is flexed, the entire air line pressure is forced against an internal leakproof valve seat. The unit has no external working parts and is constructed of steel, brass and neoprene. It is small enough to be handled instantly in any position with one hand, according to the manufacturer. Both ¼ and ½-in. sizes are available.

For More Details Circle No. 30—Page 187

Hoist: Keller Tool Co., 1305 Fulton St., Grand Haven, Mich.—Lightweight, portable, air hoist enables a worker to reach out and pick up a 150-lb load with one hand. Weighing 14 lb the hoist is designed to take the work load off production workers on repetitive handling operations involving up to 150 lb. Gearing mechanism disengages when no load is on hook, allowing free pull down of the hoist. Any load engages gears for lifting or lowering. Tension on pulldown gear is adjustable. Coil spring air hose stays out of way, diminishing or increasing in length as the hoist moves up and down the cable. No overhead tracks, trolleys or hose trolleys needed for most installations. Safety hook at upper end of cable suspends hoist from any overhead support.

For More Details Circle No. 31—Page 187

Hand Truck Extension: Magline Inc., 1949 Mercer St., Pinconning, Mich.—Folding nose-extension prevents cargo from slipping off hand trucks. When lowered for use,



the unit extends forward, beyond the nose. When raised, it rests flush against the hand truck side-members, leaving the regular nose unit free to handle conventional loads. The new unit is constructed entirely of magnesium and can be supplied with any of the company's magnesium hand trucks.

For More Details Circle No. 32—Page 187

Grinding Wheel: Bay State Abrasive Products Co., Westboro, Mass. — Construction changes in raised hub disc-wheel are designed to increase cutting speed. In action, the wheel reportedly has a "sharpness" that results in faster metal removal with less work pressure. This

sharpness also exists on the entire underside of the wheel, permitting easy grinding and blending of external corner welds and convex surfaces. The wheel has been designed for all weld grinding and portable cutoff applications. Strongly reinforced internally and on the back,

it is available in 7 and 9-in. diameters and in ⅛, 3/16 and ¼-in. thicknesses.

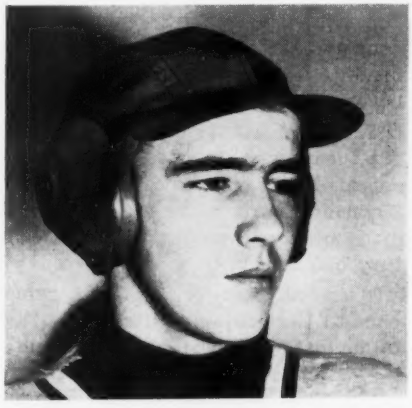
For More Details Circle No. 33—Page 187

Bulk Pallet Container: Paltier Corp., 1701 Kentucky St., Michigan City, Ind.—Canvas container for

handling bulk solids is supplied with aluminum or steel base and tiering posts. The canvas container collapses flat with the base when not in use or when being returned. When the tiering posts are set up, the canvas is raised to form a bulk container which can be used for bulk solids, granules, powders, small and light parts and other materials. The container can be furnished in canvas, duck, water-resistant materials, rubber or plastic. It is available with zipper, straps or other types of closures, or with an open top with a hook-on type of container. Standard sizes are 32 x 40 x 24 and 40 x 48 x 24 in.

For More Details Circle No. 34—Page 187

Ear Protection: Mine Safety Appliances Co., 230 North Braddock Ave., Pittsburgh 8, Pa.—Two devices are designed to protect workers exposed to high-intensity noise. Both use an over-the-ear cushion formed from a soft, spongy material which soaks up large amplitude noise waves and prevents them from



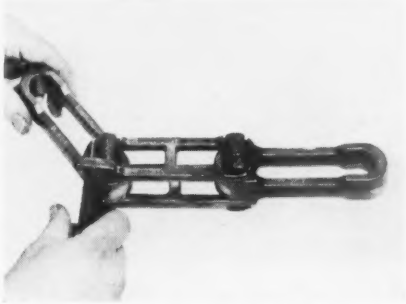
reaching the ear. One unit is a baseball-type cap which holds two cushions in positions over the ear while the other is a spring-type suspension headdress for convenient donning and removal. The former is for workers exposed continuously to high-intensity noise while the latter is for those who must enter and leave noisy areas frequently.

For More Details Circle No. 35—Page 187

Filter-Lubricator: Nu-Jett Products Corp., 1355 Michigan NE, Grand Rapids, Mich.—Adjustable filter and lubricator reportedly supplies individual protection for each air cylinder and small pneumatic tool in a plant. Unit is installed ahead of the equipment it protects and its filter has a 40 micron element which removes particles as small as 0.0001-in.

For More Details Circle No. 36—Page 187

Rivetless Chains: U. S. Engineering Co., 14561 Lesure Ave., Detroit 27, Mich.—Rivetless chains for overhead conveyor use are dimensionally interchangeable with other chains. Features include dry-lubricant-impregnated pins and machined bearing surfaces on both inner and outer links. Surface lubrication is unnecessary, coefficient of friction is



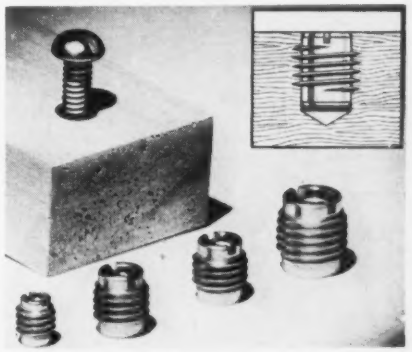
cut by 75 per cent, and chain pull is decreased, according to the manufacturer. Other advantages include low maintenance costs, no lubricant drippage on conveyed parts and operation in temperatures ranging from 30° below zero to 800° F. Three pitches and five sizes are available: L-458, L-468, L-678, L-998 and L-9118. Ultimate strength of the L-458 chain is 53,000 lb minimum.

For More Details Circle No. 37—Page 187

Bandsaw: Roll-In Saw Co., Parma, Mich.—Metal cutting bandsaw offers such features as variable speed range, tilt table, wide throat, high clearance above table, chip-dust blower and motor and overload controls. An attachment for converting the unit to a filing machine and provision for building a welder into the column are optional. Without changeover or an extra motor or hydraulic feed, the traverse table gives capacity for cutting stock up to 11 by 12½ in. by use of a counterweight controlled by a foot pedal. Blade wheel tires and saw guides permit use of blades as narrow as ⅛-in. for contour work and up to ¾-in. for cutoff.

For More Details Circle No. 38—Page 187

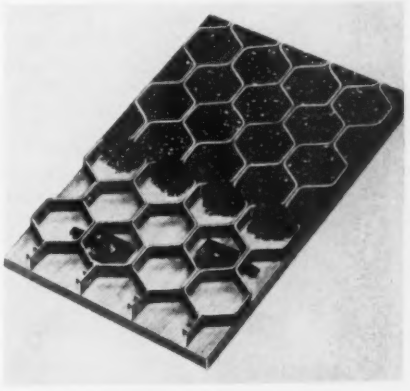
Screw-Thread Insert: Rosan Inc., 2901 West Coast Highway, Newport Beach, Calif.—Insert is designed with a sharp external thread which cuts its way into wood without crushing the fibers and provides



a tenacious hold. Made of steel, it is cadmium plated for corrosion resistance. The steel-tapped thread of the insert permits assembly or disassembly without damage to threads or loss of holding power in parent material. Many sizes are available, with either fine or coarse threads.

For More Details Circle No. 39—Page 187

Steel Floor Armor: Klemp Metal Grating Corp., 6603 South Melvina Ave., Chicago 38, Ill.——Steel safety floor armor can be used in new floor installations or in resurfacing existing concrete or wood floors. When installed and filled with hot or cold mastic a continuous floor armor is formed which eliminates cracking, swelling, warping or shrinking, according to the manufacturer. Floors



are claimed to be impervious to wheels of any size and are designed to take the brunt of rolling loads. Sides and ends of the hexagonal steel mesh design lock together for ease of installation. Power-actuated devices can be used to anchor the mesh to existing concrete or new or old wood flooring.

For More Details Circle No. 40—Page 187

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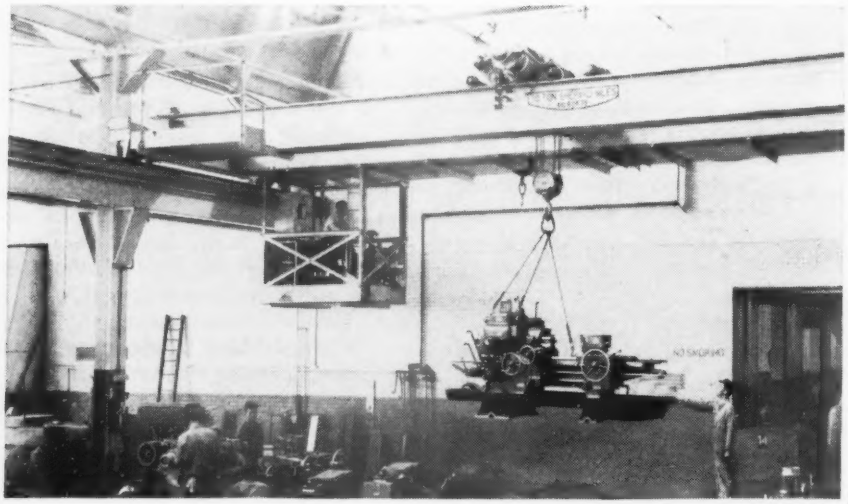

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What the Law Requires For a Valid Patent

Essentials Are Invention, Newness and Usefulness

By Albert Woodruff Gray

AN ACTION for the infringement of a blast furnace patent came before the Supreme Court of the United States on appeal many years ago. In holding that there was no valid patent and hence no infringement, the court said:

"Neither a cupola furnace nor a cinder notch is new. The use of a cinder notch for drawing off cinders from a blast furnace is as old as blast furnaces themselves. The application to a cupola furnace for the purpose of drawing off the cinders, of a cinder notch used in a blast furnace to accomplish the same end would occur to any practical man. In making this application there was no invention."

A few years later, denying the validity of a patent in another infringement action, the court supplemented this comment on the lack of these essentials for a patent by saying, "It is not enough that a thing shall be new, in the sense that in the shape or form in which it is produced it shall not have been before known, and that it shall be useful, but it must under the Constitution and the statute amount to an invention or discovery."

The Patent Law as amended in 1952 provides, "Whoever invents or discovers any new and useful process, machine, manufacture or composition of matter, or any new and useful improvement thereon, may obtain a patent therefor subject to the conditions and requirements of this article."

These essentials for a patent lie in the three words of this statute—"invents," "new" and "useful"—and courts have rigidly restricted the benefits of the patent law to discoveries possessing these features.

The federal appellate court only a few years ago in a patent decision repeated this rule laid down by the Supreme Court in the decision it had made nearly three quarters of a century before.

"Generally speaking, with reference to the subject matter permitted to be patented, there are four ultimate facts which must exist before an invention is patentable—authorship, ownership, novelty not as a result of mere mechanical skill, and utility. If they exist concurrently the discovery is patentable; if one is

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lacking it is not patentable."

An opinion of one of the justices concurring in a recent decision of the Supreme Court in which a patent was held invalid for lack of these essentials had this to say of the purpose of this rigid adherence to the rule requiring these factors of invention, novelty and utility:

"It was never the object of these laws to grant a monopoly for every trifling device, every shape of a shade of an idea, which would naturally and spontaneously occur to any skilled mechanic or operator in the ordinary progress of manufacture. Such an indiscriminate creation of exclusive privileges tends rather to obstruct than to stimulate invention.

"It creates a class of speculative schemers who make it their business to watch the advancing wave of improvement and gather its foam in the form of patent monopolies, which enable them to lay a heavy tax upon the industry of the country without contributing anything to the real advancement of the arts. It embarrasses the honest pursuit of business with fears and apprehensions of concealed liens and unknown liabilities to lawsuits and vexatious accountings for profits made in good faith."

References

Vinton v. Hamilton, 104 U. S. 485
Thompson v. Boisselier, 114 U. S. 1
Galland-Henning Mfg. Co. v. Logemann Bros. Co., 142 Fed. 2d 700
Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp., 340 U. S. 117

Giant-Sized Banners Are Aid In Prevention of Accidents

National Safety Council has added giant-sized accident prevention banners to its supply of safety training aids. Banners are 10 ft long x 3½ ft deep and come in two styles—one for indoor and the other for outdoor display. Indoor style is made from display duck and has eight metal grommets for ease of mounting. Outdoor style is made from heavy duty duck, weatherproofed and vented, and has ropes stitched to top and bottom for fastening. Signboard inks are guaranteed against fading for a minimum of 30 days when exposed to weather.

Banners point up practical safety slogans with attention-getting drawings. Twelve banners, one for each month of the year, are available on an annual subscription basis. Each banner is shipped by the 15th of the month preceding its scheduled use. For a flyer showing miniatures in full color, and for information on prices, write the National Safety Council, 425 North Michigan Ave., Chicago 11.

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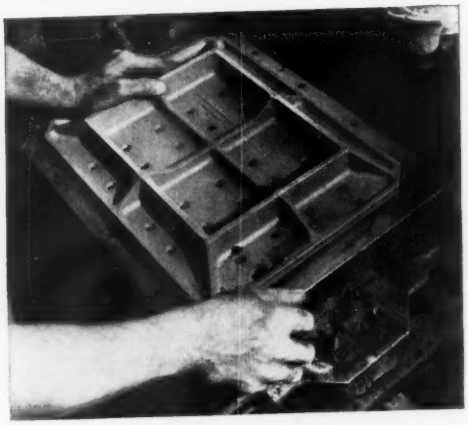
Memo to foundry superintendents:

Two specific points about Edco Dowmetal Bottom Boards—

✓1. the flask side is grooved and vented to permit the escape of gases— insure mold stability.

✓2. the opposite side is braced like a bridge— gives you strength without weight for safe, easy handling and long board life.



The entire board, of course, is made of light-weight magnesium.

✓Write for price schedule, and list of 83 standard sizes —

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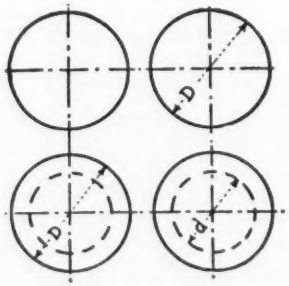
Edco Dowmetal Bottom Boards · Edco Aluminum Ingot

Data on Weights of Solid or Hollow Balls or Spheres



In the accompanying tables are given the weight of balls or spheres in pounds for different diameters D.

To find the weight of a hollow ball, subtract the weight corresponding to the inside diameter d from the weight corresponding to the outside diameter D.

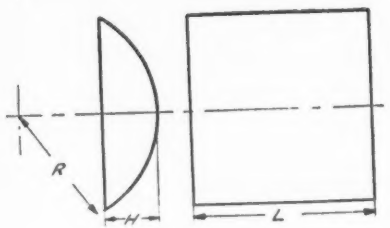
Dia. in in.	Weight of Ball or Sphere When Cast in: Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
3/8	.007	.008	.003	.009	.007	.009	.008
1/2	.017	.019	.006	.021	.017	.021	.020
5/8	.033	.036	.012	.041	.032	.040	.039
3/4	.058	.063	.021	.071	.056	.070	.067
7/8	.091	.099	.034	.112	.089	.111	.106
1	.136	.148	.050	.167	.132	.165	.158
1 1/8	.194	.212	.072	.238	.189	.235	.226
1 1/4	.267	.290	.098	.223	.259	.319	.310
1 3/8	.354	.385	.131	.435	.345	.429	.413
1 1/2	.460	.500	.170	.564	.446	.556	.535
1 5/8	.586	.636	.217	.717	.569	.707	.680
1 3/4	.732	.795	.271	.896	.721	.884	.851
1 7/8	.900	.976	.332	1.10	.873	1.09	1.05
2	1.09	1.19	.404	1.34	1.06	1.32	1.27
2 1/8	1.31	1.42	.484	1.60	1.27	1.58	1.52
2 1/4	1.56	1.69	.575	1.91	1.51	1.88	1.81
2 3/8	1.83	1.99	.675	2.24	1.77	2.21	2.12
2 1/2	2.13	2 32	.788	2.60	2.07	2.56	2.48
2 5/8	2.47	2.68	.914	3.02	2.40	2.93	2.87
2 3/4	2.84	3.06	1.05	3.47	2.76	3.42	3.30
2 7/8	3.24	3.52	1.20	3.93	3.15	3.92	3.78
3	3.68	4.00	1.36	4.51	3.57	4.45	4.29
3 1/8	4.16	4.52	1.54	5.10	4.05	5.03	4.84
3 1/4	4.68	5.09	1.73	5.73	4.55	5.65	5.44
3 3/8	5.25	5.70	1.94	6.19	5.09	6.34	6.10
3 1/2	5.86	6.36	2.17	7.16	5.69	7.06	6.82
3 5/8	6.50	7.06	2.40	7.96	6.31	7.85	7.55
3 3/4	7.20	7.83	2.66	8.84	7.00	8.70	8.37
3 7/8	7.95	8.64	2.94	9.74	7.71	9.60	9.24

Dia. in in.	Weight of Ball or Sphere When Cast in: Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
4	8.74	9.50	3.23	10.7	8.48	10.6	10.1
4 1/8	9.57	10.4	3.54	11.7	9.30	11.6	11.1
4 1/4	10.5	11.4	3.87	12.8	10.2	12.7	12.1
4 3/8	11.4	12.4	4.22	13.9	11.1	13.8	13.3
4 1/2	12.4	13.5	4.60	15.3	12.1	15.1	14.4
4 5/8	13.5	14.7	4.99	16.6	13.1	16.4	15.7
4 3/4	14.6	15.9	5.41	17.9	14.2	17.7	17.0
4 7/8	15.8	17.2	5.84	19.4	15.3	19.1	18.3
5	17.1	18.5	6.30	20.9	16.6	20.6	19.8
5 1/8	18.4	19.9	6.78	22.5	17.8	22.2	21.3
5 1/4	19.8	21.5	7.30	24.2	19.2	23.9	22.9
5 3/8	21.2	23.0	7.83	25.9	20.6	25.6	24.6
5 1/2	22.8	24.7	8.40	27.9	22.0	27.5	26.4
5 5/8	24.3	26.2	9.98	29.8	23.6	29.4	28.2
5 3/4	26.0	28.2	9.60	31.8	25.2	31.4	30.2
5 7/8	27.6	30.0	10.2	33.9	26.8	33.4	32.2
6	29.7	32.0	10.9	36.1	28.6	35.6	34.3
6 1/8	31.4	34.1	11.6	38.4	30.5	37.9	36.5
6 1/4	33.2	36.2	12.3	40.8	32.3	40.2	33.7
6 3/8	35.4	38.4	13.1	43.2	34.3	42.6	41.1
6 1/2	37.4	40.7	13.8	45.8	36.4	45.2	43.5
6 5/8	39.7	43.1	14.7	48.7	38.6	48.0	46.2
6 3/4	42.0	45.7	15.5	51.5	40.8	50.8	48.9
6 7/8	44.4	48.2	16.4	54.4	43.1	53.6	51.6
7	46.8	50.9	17.3	57.3	45.4	56.5	54.5
7 1/8	49.4	53.7	18.3	60.5	48.0	59.6	57.4
7 1/4	52.0	56.5	19.2	63.7	50.5	62.8	60.5
7 3/8	54.8	59.6	20.2	67.1	53.1	66.2	63.8
7 1/2	57.5	62.6	21.3	70.5	56.0	69.5	67.0

Dia. in in.	Weight of Ball or Sphere When Cast in: Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
7 5/8	60.6	65.8	22.4	74.1	58.8	73.1	70.4
7 3/4	63.5	69.0	23.4	77.7	61.5	76.6	73.7
7 7/8	66.6	72.4	24.6	81.5	64.6	80.4	78.5
8	70.0	76.0	25.8	85.7	68.0	84.5	81.4
8 1/8	73.2	79.6	27.1	89.8	71.1	88.5	85.1
8 1/4	76.7	83.4	28.4	94.0	74.5	92.6	89.2
8 3/8	80.0	87.0	29.6	98.0	77.8	96.6	93.1
8 1/2	83.7	91.0	31.0	103	81.4	101	97.5
8 5/8	87.5	95.0	32.4	107	85.0	106	102
8 3/4	91.5	99.5	33.8	113	88.8	111	106
8 7/8	95.5	104	35.3	118	92.5	116	111
9	99.5	108	36.8	122	96.5	120	115
9 1/8	104	113	38.3	127	100	125	120
9 1/4	108	117	39.8	133	105	131	125
9 3/8	112	122	41.5	138	109	136	130
9 1/2	117	127	43.2	144	114	142	136
9 5/8	122	132	45.0	149	118	147	141
9 3/4	127	138	46.8	155	123	153	147
9 7/8	131	143	48.5	161	127	159	153
10	136	148	50.4	167	132	165	159
10 1/8	141	154	52.4	173	137	171	164
10 1/4	147	159	54.3	180	142	178	170
10 3/8	152	165	56.2	186	148	184	177
10 1/2	158	172	58.3	194	153	191	184
10 5/8	164	178	60.4	201	159	198	190
10 3/4	170	184	63.0	209	165	206	197
10 7/8	175	191	64.8	215	170	212	204
11	182	197	67.0	223	176	220	211
11 1/8	188	204	69.5	231	182	223	218
11 1/4	195	212	71.9	239	189	236	226
11 3/8	201	218	74.3	246	196	243	234
11 1/2	208	226	76.6	256	202	252	241
11 5/8	216	234	79.5	264	208	260	250
11 3/4	221	240	81.5	272	215	268	257
11 7/8	228	248	84.3	280	222	276	266
12	236	256	87.0	289	229	285	274
12 1/4	251	273	92.6	307	243	303	292
12 1/2	267	287	98.5	323	259	319	307

Dia. in in.	Weight of Ball or Sphere When Cast in: Cast iron	Steel	Aluminum	Copper	Zinc	Gun metal	Yellow brass
12 3/4	283	308	105	347	274	342	328
13	300	326	111	367	291	362	348
13 1/4	315	344	117	388	308	383	369
13 1/2	335	364	124	411	326	405	390
13 3/4	355	386	131	435	344	429	413
14	374	407	138	458	363	452	435
14 1/4	395	429	146	484	383	477	459
14 1/2	416	452	154	509	404	502	484
14 3/4	438	476	162	538	425	530	509
15	460	500	170	564	447	556	535
15 1/4	484	525	179	592	470	584	562
15 1/2	507	552	188	623	493	614	590
15 3/4	534	580	197	654	518	645	620
16	560	609	207	686	543	676	650
16 1/4	586	636	217	717	568	707	681
16 1/2	613	666	226	751	595	740	712
16 3/4	641	696	237	786	622	775	745
17	670	729	248	822	650	810	780
17 1/4	700	760	259	858	681	846	815
17 1/2	732	795	270	897	710	884	850
17 3/4	764	829	282	935	741	922	887
18	795	864	294	974	772	960	924
18 1/4	830	901	307	1,013	806	1,001	965
18 1/2	864	938	320	1,058	839	1,044	1,002
18 3/4	900	977	332	1,102	873	1,088	1,045
19	936	1,013	346	1,149	909	1,130	1,088
19 1/4	974	1,058	360	1,190	945	1,173	1,130
19 1/2	1,012	1,100	375	1,240	983	1,224	1,173
19 3/4	1,051	1,142	389	1,290	1,021	1,270	1,220
20	1,091	1,188	404	1,340	1,060	1,320	1,270
20 1/2	1,178	1,278	435	1,441	1,140	1,420	1,363
21	1,262	1,371	467	1,549	1 225	1,525	1,467
21 1/2	1,360	1,475	503	1,665	1,318	1,641	1,580
22	1,453	1,580	538	1,781	1,411	1,758	1,690
22 1/2	1,555	1,689	575	1,908	1,509	1,880	1,810
23	1,662	1,808	614	2,040	1,611	2,005	1,930
23 1/2	1,770	1,920	654	2,166	1,718	2,140	2,054
24	1,885	2,048	696	2,310	1,828	2,280	2,188

Formula for Finding the Weight of Cast Steel Segmental Bars



To find the weight of a cast steel bar whose cross section is a segment of a circle, first divide the height by the radius, and in the table opposite this quotient find K. Then, the weight required is the product of K, the radius squared and the length.

$$W = WR^2L$$

If H is greater than R, find the weight of cylinder of Radius R and subtract weight of part cut away from cylinder.

H/R	K	H/R	K	H/R	K	H/K	R	H/K	R	H/K	R	H/K	R
0.030	0.0028	0.134	0.0257	0.190	0.0430	0.246	0.0628	0.302	0.0845	0.358	0.1081	0.414	0.1331
0.040	0.0043	0.136	0.0263	0.192	0.0436	0.248	0.0635	0.304	0.0854	0.360	0.1089	0.416	0.1341
0.050	0.0060	0.138	0.0268	0.194	0.0443	0.250	0.0642	0.306	0.0862	0.362	0.1098	0.418	0.1350
0.060	0.0078	0.140	0.0274	0.196	0.0449	0.252	0.0650	0.308	0.0870	0.364	0.1107	0.420	0.1359
0.070	0.0098	0.142	0.0280	0.198	0.0457	0.254	0.0657	0.310	0.0878	0.366	0.1116	0.422	0.1368
0.080	0.0120	0.144	0.0286	0.200	0.0463	0.256	0.0665	0.312	0.0886	0.368	0.1124	0.424	0.1377
0.090	0.0143	0.146	0.0292	0.202	0.0470	0.258	0.0672	0.314	0.0894	0.370	0.1133	0.426	0.1387
0.092	0.0148	0.148	0.0298	0.204	0.0477	0.260	0.0680	0.316	0.0903	0.372	0.1142	0.428	0.1396
0.094	0.0152	0.150	0.0304	0.206	0.0484	0.262	0.0688	0.318	0.0911	0.374	0.1151	0.430	0.1405
0.096	0.0157	0.152	0.0310	0.208	0.0491	0.264	0.0695	0.320	0.0919	0.376	0.1159	0.432	0.1415
0.098	0.0161	0.154	0.0316	0.210	0.0498	0.266	0.0703	0.322	0.0928	0.378	0.1168	0.434	0.1424
0.100	0.0166	0.156	0.0322	0.212	0.0505	0.268	0.0711	0.324	0.0936	0.380	0.1177	0.436	0.1433
0.102	0.0171	0.158	0.0328	0.214	0.0512	0.270	0.0719	0.326	0.0944	0.382	0.1186	0.438	0.1443
0.104	0.0176	0.160	0.0334	0.216	0.0519	0.272	0.0726	0.328	0.0953	0.384	0.1195	0.440	0.1452
0.106	0.0182	0.162	0.0340	0.218	0.0526	0.274	0.0734	0.330	0.0961	0.386	0.1204	0.442	0.1462
0.108	0.0187	0.164	0.0346	0.220	0.0533	0.276	0.0742	0.332	0.0969	0.388	0.1213	0.444	0.1471
0.110	0.0192	0.166	0.0353	0.222	0.0540	0.278	0.0750	0.334	0.0978	0.390	0.1222	0.446	0.1480
0.112	0.0197	0.168	0.0359	0.224	0.0547	0.280	0.0757	0.336	0.0987	0.392	0.1231	0.448	0.1489
0.114	0.0202	0.170	0.0365	0.226	0.0554	0.282	0.0765	0.338	0.0995	0.394	0.1240	0.450	0.1499
0.116	0.0208	0.172	0.0371	0.228	0.0562	0.284	0.0773	0.340	0.1003	0.396	0.1249	0.452	0.1509
0.118	0.0213	0.174	0.0378	0.230	0.0569	0.286	0.0781	0.342	0.1012	0.398	0.1258	0.454	0.1518
0.120	0.0218	0.176	0.0384	0.232	0.0576	0.288	0.0789	0.344	0.1020	0.400	0.1267	0.456	0.1528
0.122	0.0224	0.178	0.0391	0.234	0.0583	0.290	0.0797	0.346	0.1029	0.402	0.1276	0.458	0.1537
0.124	0.0229	0.180	0.0397	0.236	0.0591	0.292	0.0805	0.348	0.1038	0.404	0.1286	0.460	0.1547
0.126	0.0235	0.182	0.0401	0.238	0.0598	0.294	0.0813	0.350	0.1046	0.406	0.1295	0.462	0.1556
0.128	0.0240	0.184	0.0410	0.240	0.0605	0.296	0.0821	0.352	0.1055	0.408	0.1304	0.464	0.1566
0.130	0.0246	0.186	0.0417	0.242	0.0613	0.298	0.0829	0.354	0.1063	0.410	0.1313	0.466	0.1575
0.132	0.0251	0.188	0.0423	0.244	0.0620	0.300	0.0837	0.356	0.1072	0.412	0.1322	0.468	0.1585

H/R	K	H/R	K	H/R	K	H/R	K	H/R	K	H/R	K	H/R	K
0.470	0.1595	0.550	0.1990	0.630	0.2403	0.710	0.2831	0.790	0.3269	0.870	0.3716	0.950	0.4167
0.472	0.1604	0.552	0.2000	0.632	0.2414	0.712	0.2842	0.792	0.3280	0.872	0.3727	0.952	0.4179
0.474	0.1614	0.554	0.2010	0.634	0.2424	0.714	0.2852	0.794	0.3291	0.874	0.3739	0.954	0.4190
0.476	0.1623	0.556	0.2020	0.636	0.2435	0.716	0.2863	0.796	0.3303	0.876	0.3750	0.956	0.4201
0.478	0.1633	0.558	0.2031	0.638	0.2445	0.718	0.2874	0.798	0.3314	0.878	0.3761	0.958	0.4212
0.480	0.1643	0.560	0.2041	0.640	0.2456	0.720	0.2885	0.800	0.3325	0.880	0.3772	0.960	0.4224
0.482	0.1652	0.562	0.2051	0.642	0.2467	0.722	0.2896	0.802	0.3336	0.882	0.3784	0.962	0.4235
0.484	0.1662	0.564	0.2061	0.644	0.2477	0.724	0.2907	0.804	0.3347	0.884	0.3795	0.964	0.4246
0.486	0.1672	0.566	0.2072	0.646	0.2488	0.726	0.2918	0.806	0.3358	0.886	0.3806	0.966	0.4258
0.488	0.1682	0.568	0.2082	0.648	0.2498	0.728	0.2928	0.808	0.3369	0.888	0.3817	0.968	0.4269
0.490	0.1691	0.570	0.2092	0.650	0.2509	0.730	0.2939	0.810	0.3380	0.890	0.3829	0.970	0.4280
0.492	0.1701	0.572	0.2102	0.652	0.2520	0.732	0.2950	0.812	0.3392	0.892	0.3840	0.972	0.4292
0.494	0.1711	0.574	0.2112	0.654	0.2530	0.734	0.2961	0.814	0.3403	0.894	0.3851	0.974	0.4303
0.496	0.1721	0.576	0.2123	0.656	0.2541	0.736	0.2972	0.816	0.3414	0.896	0.3862	0.976	0.4314
0.498	0.1730	0.578	0.2133	0.658	0.2551	0.738	0.2983	0.818	0.3425	0.898	0.3874	0.978	0.4326
0.500	0.1740	0.580	0.2143	0.660	0.2562	0.740	0.2994	0.820	0.3436	0.900	0.3885	0.980	0.4337
0.502	0.1750	0.582	0.2154	0.662	0.2573	0.742	0.3005	0.822	0.3447	0.902	0.3896	0.982	0.4348
0.504	0.1760	0.584	0.2164	0.664	0.2583	0.744	0.3016	0.824	0.3459	0.904	0.3907	0.984	0.4359
0.506	0.1770	0.586	0.2174	0.666	0.2594	0.746	0.3027	0.826	0.3470	0.906	0.3919	0.986	0.4371
0.508	0.1780	0.588	0.2185	0.668	0.2605	0.748	0.3038	0.828	0.3481	0.908	0.3930	0.988	0.4382
0.510	0.1789	0.590	0.2195	0.670	0.2615	0.750	0.3049	0.830	0.3492	0.910	0.3940	0.990	0.4393
0.512	0.1799	0.592	0.2205	0.672	0.2626	0.752	0.3060	0.832	0.3503	0.912	0.3953	0.992	0.4405
0.514	0.1809	0.594	0.2216	0.674	0.2636	0.754	0.3071	0.834	0.3514	0.914	0.3964	0.994	0.4419
0.516	0.1819	0.596	0.2226	0.676	0.2647	0.756	0.3082	0.836	0.3526	0.916	0.3975	0.996	0.4427
0.518	0.1829	0.598	0.2236	0.678	0.2658	0.758	0.3093	0.838	0.3537	0.918	0.3986	0.998	0.4439
0.520	0.1839	0.600	0.2247	0.680	0.2669	0.760	0.3104	0.840	0.3548	0.920	0.3998	1.000	0.4450
0.522	0.1849	0.602	0.2257	0.682	0.2680	0.762	0.3115	0.842	0.3559	0.922	0.4009		
0.524	0.1859	0.604	0.2268	0.684	0.2690	0.764	0.3126	0.844	0.3570	0.924	0.4020		
0.526	0.1869	0.606	0.2278	0.686	0.2701	0.766	0.3137	0.846	0.3581	0.926	0.4032		
0.528	0.1879	0.608	0.2288	0.688	0.2712	0.768	0.3148	0.848	0.3593	0.928	0.4043		
0.530	0.1889	0.610	0.2299	0.690	0.2723	0.770	0.3159	0.850	0.3604	0.930	0.4054		
0.532	0.1899	0.612	0.2309	0.692	0.2734	0.772	0.3170	0.852	0.3615	0.932	0.4066		
0.534	0.1909	0.614	0.2319	0.694	0.2744	0.774	0.3181	0.854	0.3626	0.934	0.4077		
0.536	0.1919	0.616	0.2330	0.696	0.2755	0.776	0.3192	0.856	0.3638	0.936	0.4088		
0.538	0.1929	0.618	0.2340	0.698	0.2766	0.778	0.3203	0.858	0.3649	0.938	0.4099		
0.540	0.1939	0.620	0.2351	0.700	0.2777	0.780	0.3214	0.860	0.3660	0.940	0.4111		
0.542	0.1950	0.622	0.2362	0.702	0.2787	0.782	0.3225	0.862	0.3671	0.942	0.4122		
0.544	0.1960	0.624	0.2372	0.704	0.2798	0.784	0.3236	0.864	0.3682	0.944	0.4133		
0.546	0.1970	0.626	0.2382	0.706	0.2809	0.786	0.3247	0.866	0.3694	0.946	0.4145		
0.548	0.1980	0.628	0.2393	0.708	0.2820	0.788	0.3258	0.868	0.3705	0.948	0.4156		

PROOF of LONGER LADLE LIFE with IRONTON NOJOINT

26 MONTHS SERVICE

$.0056 REFRACTORY COST PER TON

5200 TONS OF METAL HANDLED WITH LINING OF **NOJOINT**

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MANUFACTURERS OF
EQUIPMENT FOR CHEMICAL, SUGAR AND ALLIED INDUSTRIES
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U. S. A.

SERVICE REPORT
Ladle #3 - 12,000 lb. capacity
Lined Aug. 20, 1952
Relined Nov. 5, 1954
Refractory Cost $30.00
Type of metal - gray iron
A. W. Varnon
Foundry Superintendent

Mr. Varnon states that no maintenance or patching was ever done on the sides or bottom of the ladle. The *Ironton* NOJOINT was used exactly as received. Ladles with capacities of 14,000#, 18,000# and 30,000# — as well as numerous smaller ladles . . . lined with *Ironton* NOJOINT . . . have been in service for 12 months or more. None of these linings show signs of needing replacement yet. Competitive materials averaged *only one month's* service. Test and prove to yourself the value of *Ironton* NOJOINT in your own foundry.

IRONTON SERVICE ENGINEERS will be glad to supervise the installation of *Ironton* NOJOINT in your foundry. WRITE OR PHONE TODAY

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EQUIPMENT MANUFACTURERS MEET

Discuss Products, Industry Status, Use of Castings

By FRANK G. STEINEBACH
Editor

THE FOUNDRY Equipment Manufacturers' Association held its first Washington spring meeting at the Sheraton-Carlton on Apr. 15. An exceptionally large attendance and an interesting program indicate that this type of meeting may become an annual affair of the society.

Separate product group meetings were held in the morning for these classifications: Blast Cleaning and Tumbling Equipment; Flasks, Jackets and Accessories; Furnaces and Accessories; Material Handling Equipment; and Molding and Coremaking Machines.

With a large attendance of members and invited guests representing much of the capacity of producers of dust and fume control equipment, a special program was provided for that product group of the association. John M. Kane, American Air Filter Co., Louisville, and chairman of the Dust and Fume Control Equipment Group, presided.

Arthur C. Stein, chief, Air Pollution Control Program, U. S. Department of Health, Education and Welfare, Cincinnati, discussed the problems in "Tailoring the Air Pollution Ordinance to the Needs of the Community." He stated that zoning ordinances by themselves have not proved sufficient legislation for air pollution control. They are ineffective against residential, mobile and portable sources. If a community must choose between two forms of ordinance, an air pollution control ordinance alone is preferable. However, the small community gets the best legislative package by adopting both an air pollution control ordinance and a zoning ordinance, each of which is tailored to supplement and complement the other.

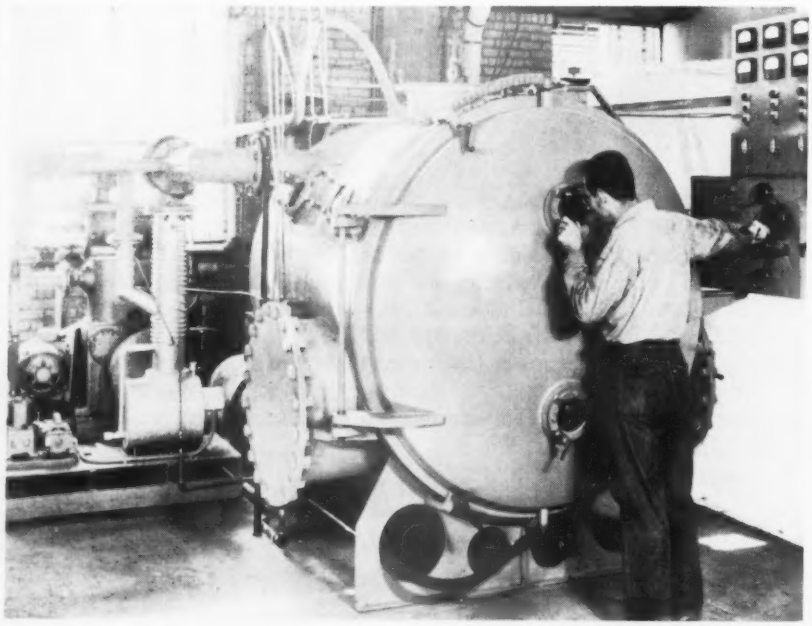
Speaking on "The Dust Control Engineer and the Process Designer Should Work Closer Together," Prof. Theodore F. Hatch, University of Pittsburgh, stated that no other major industry has accomplished so much in the field of dust control as the foundry industry. In no other industry have the changes been so drastic. Working environment in foundries is being made at the proper level for the health, welfare and comfort of workers.

Professor Hatch pointed out that dust particles have increased in proportion to the number of castings produced per square foot of floor space. Mechanization of operations has increased the problem. The speaker warned that the dust control group is being consulted too late. By a little analysis on the part of dust control people in the early stages of mechanization planning, it might be seen that a little alteration in the process would decrease the dust potential. He insisted that the process designer has a duty to consult with the dust control man to determine how to minimize the production of dust. After the installation is in operation, every effort should be made to keep the dust control equipment tight.

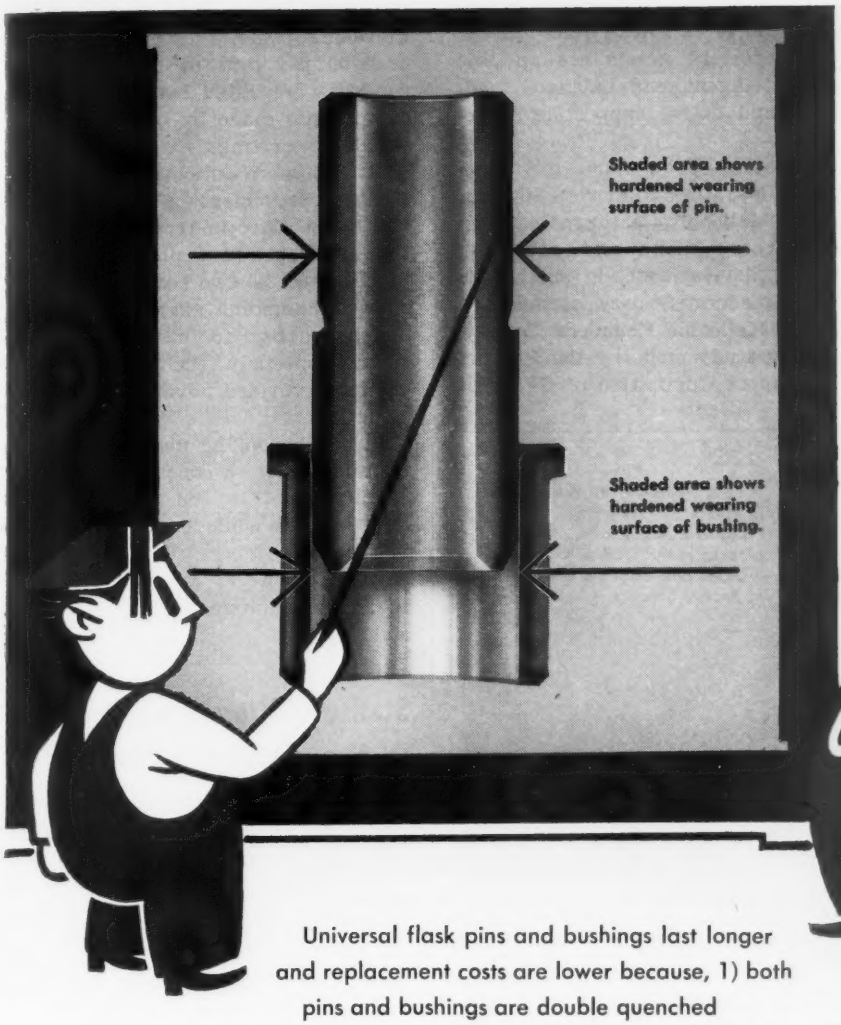
Einar A. Borch, National Metal Abrasive Co., Cleveland, and chairman of the FEMA Statistical Committee, reported that the trend in equipment sales is upward. This swing results from the fact that industry is using present equipment and is using it hard. The shortcomings of outmoded equipment are becoming apparent. Furthermore, there has been a restoration of business confidence in recent months.

Mr. Borch emphasized that this is a vital period for the producer of foundry equipment. Now is the time to drive home sales facts. Now is the time to sell. Many potential buyers are suffering from procrastination. In fact, Mr. Borch believes that some potential customers will procrastinate themselves out of business if the equipment manufacturer will let them. Every effort should be made to further the idea that now is the time to buy.

At the joint session of all product groups in the afternoon, Charles W. Stewart, executive vice president, Machinery & Allied Products Institute, Washington, discussed "Statesmanship in Government-Industry Relations." Mr. Stewart stated that business has a primary obligation to participate in the development of effective liaison between government and industry. Business statesmanship, a prerequisite to such a development, requires that business repre-



TITANIUM MELTING: An arc-melting vacuum skull furnace capable of pouring 50 lb of titanium per charge has been added to the facilities of the metallurgical research department of National Research Corp., Cambridge, Mass. Designed and built by the firm's equipment division, the furnace is large enough to permit production of either large castings or of several small parts at once. Castings reportedly are made with following typical interstitials content, by weight: C, less than 0.02 per cent; O, less than 0.06 per cent; H, less than 0.01 per cent



how the long life of UNIVERSAL flask pins and bushings saves dollars in your foundry operations

Universal flask pins and bushings last longer and replacement costs are lower because, 1) both pins and bushings are double quenched and double drawn to produce strong, ductile cores that can take rough treatment in the foundry without breaking or chipping and, 2) wearing surfaces are carburized and hardened to withstand wear. Universal flask pins and bushings are precision ground to insure instant, accurate alignment of cope and drag. For complete information, write to Universal Engineering Sales Co., 1060 Broad St., Newark 2, N.J.; 5035 Sixth Ave., Kenosha, Wis.; or the home office.

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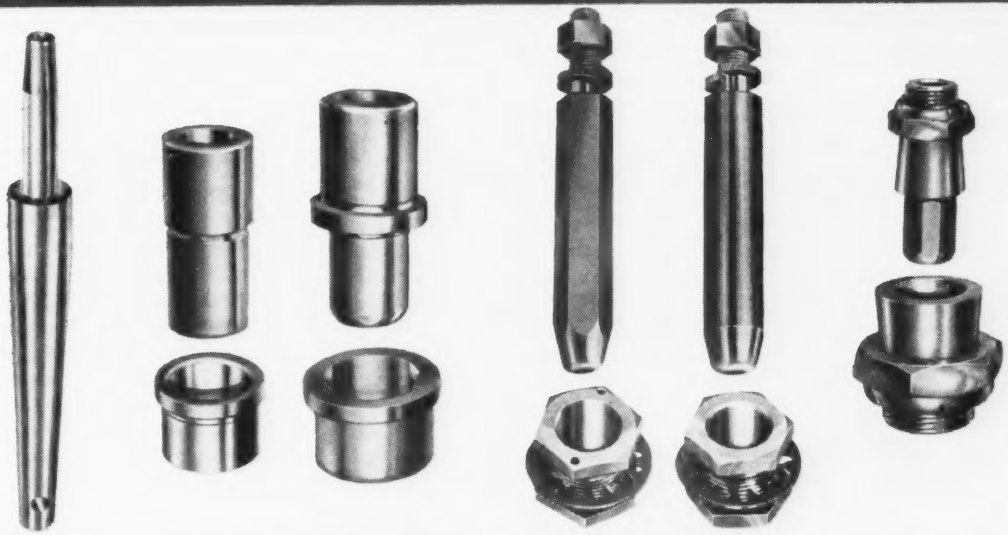

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sentatives be articulate, have a continuing appreciation of the public interest, deal with public issues directly and courageously, and have a good sense of timing.

Mr. Stewart then applied these principles to a discussion of government-industry relations with activities of the Export-Import Bank, government contracts and renegotiation, provisions of the Internal Revenue Code, and government controls as part of a mobilization program. In carrying out the business responsibility in government-industry relations, effective business organizations have a vital role. Their most important assets are an able staff, intelligent and balanced leadership, and active support of members.

In stating "The Case for Castings," Ross L. Gilmore, Superior Steel & Malleable Castings Co., Benton Harbor, Mich., and active in product development in both the Steel Founders' Society of America and the Malleable Founders' Society, told of a study made by the Product Development Committee of SFSA at the 1954 AFS Foundry Show in Cleveland. This study indicated that over 50 per cent of the equipment would be improved by conversion of components made by competing materials to castings.

Mr. Gilmore discussed the constant improvement in quality that has taken place in recent years, and the important part played by castings during the two recent wars. He showed numerous examples of good and bad design for castings, emphasizing especially the places where castings provided advantages of construction.

In conclusion, he urged equipment manufacturers to consider the use of castings, and to consult with castings sources while the equipment is in the design stage. Foundries have capable engineers ready and willing to assist in producing the best possible product.

Sly Convectioneered Box Oven at plant of American Crucible Products Co., Lorain, Ohio, a pioneer in the field of high lead, bronzes and babbitts and maker of Promet Bronzes.

SLY CONVECTIONEERED*

production doubled

Core baking improved with SLY Convectioneered Oven

Last fall the American Crucible Products Co. replaced an old type line burner oven with this modern Sly *Convectioneered* Oven.

What happened?

(1) **Production doubled** — or tripled if conditions require.

(2) **Cores baked evenly** — stronger, better cores — less scrap.

A modern, forced convection heating system is used. This efficient handling of heated air in Sly Ovens is the key to their efficiency. Properly located ducts of generous size, in relation to the circulating fan, insure free air flow and even distribution.

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Statistical Procedures Topic Of New Government Reports

Rule-of-thumb statistical procedures to insure accurate sampling results and save time and expense in experimentation are the subject of two new studies completed under Wright Air Development Center contracts. Reports on these studies have been made available to industry by the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

"Statistical Inference, Reliability and Significance" (PB 111538) contains some basic concepts of random sampling, considers reliability and significance of certain statistical measures and discusses confidence limits as a measure of reliability. Price is $1.75.

"The Power of Statistical Tests" (PB 111588) describes the concept of power for statistical hypotheses as well as various ideas connected with it. Price is $2.50.

Publishes Book on Titanium

Phase diagrams and discussions of 48 binary and 22 ternary titanium alloy systems are included in a reference work published by the Office of Technical Services, U. S. Department of Commerce, Washington 25. Information in the 261-page volume, *Constitution of Titanium Alloy Systems,* was compiled by Battelle Memorial Institute for the Wright Air Development Center and is made available to hasten development of titanium technology. Copies of the book are $8 and may be ordered from the Office of Technical Services.

Accident Prevention In Modern Foundries

By James L. Turpin*

"AN OUNCE of prevention is worth a pound of cure," goes a familiar proverb. This old saying may have been true with regard to accident prevention in yesterday's foundries with their wooden core wagons, their slow-moving wheelbarrows of sand and sprue and their manually-operated tote boxes. But today's foundries are almost all mechanized in some way. Sand is conveyed on fast-moving belts, sprue is hauled in heavy pallets by swift lift trucks, and castings are moved from floor to floor in conveyor buckets or with overhead cranes.

All this speedy machinery, although doing an excellent job in casting production, by its very nature creates hazards for every employee in the shop. So, with accident prevention in mind, let us re-word that old proverb to read, "A *pound* of prevention is worth a *ton* of cure!"

Accidents, though, are not always caused directly by moving machinery. This is due to the fact that "pounds" of prevention have been designed in the way of rails alongside belts and around quench tanks; safety switches on hydraulic presses; and, of course, safety shoes and glasses, leggings, helmets and gloves. By far the most injuries are sustained by individuals who use less than on "ounce" of prevention when they take chances, play around on the job, ignore safety rules or let their minds wander to the golf course, the lake or the coming vacation trip. Prevention of a mishap, often begins with our mental alertness, which permits us to foresee danger in time to circumvent it.

Actually, safety begins at home. It starts when we caution our wife to be careful with the hot bacon grease or the boiling coffee at breakfast time. It is impressed on our children as we send them off to school with the words, "Look both ways before you cross the street!" It accompanies us to work as we drive through traffic where a careless move could mean a wreck or perhaps a fatal injury. But merely taking "pounds" of prevention from home to the foundry does not assure us of an accident-free day. Look how this can be done.

What's around that corner? Maybe nothing, but it could be a truck moving too fast to stop in time. What's flying in the air that might injure the eyes? Perhaps nothing, but there could be sand or sparks or cleaning shot. What possible harm could an aimlessly tossed bottle do in the mold sand? Perhaps nothing, but, if it breaks, deep hand lacerations might be the result. What if floors do become greasy? Or the gangways littered with sprue or broken cores? Well, that all depends on our ability to step in the right places at the right time; if we misstep, however, it may take "tons of cure" before we are out of the hospital and back on the job.

How about that ladder? Will it slip at the bottom while you are welding that beam? Is it out in the aisle where some moving vehicle could hit it while you are engrossed in fitting a pipe 25 feet about the concrete? And say, as you swing that ladle full of molten metal around to pour a mold, is your fellow worker at a safe distance or is he on his way back to the furnace just in time to receive severe burns? Re-

*This letter won first prize in the 1954 Safety Letter Contest recently conducted by the Malleable Founders' Society. Mr. Turpin is cost department supervisor at the Indianapolis plant of National Malleable & Steel Castings Co., which he joined in 1950. He attended Gilead College, near Ithaca, N. Y., and spent six years working in Greece and Turkey before he joined National Malleable & Steel Castings.

PORCELAIN PRODUCTS *PORITE* CERAMIC STRAINER CORES

It's a proven fact, if you *now* use sand strainer cores . . . that Porcelain Products *Porite ceramic* cores *will* reduce casting rejects—provide your customers with cleaner, slag-free castings—and save *you* money besides! *Porite* cores *will not* spall, erode, or disintegrate during pouring, resulting in a foundry product free from sand inclusions. *Porite* cores permit controlled pouring—reduce machining time. Bonded with interlocking refactory crystals, Porite Ceramic Strainer cores withstand high-heat, thermal shock—can be stored indefinitely.

Make this *free test*—yourself! Simply tell us the size and quantities of sand strainer cores you now use—or send samples, and we will send you free Porite ceramic cores, from our large stock of standard sizes. Write today! Special sizes made on order to fit specific requirements.

MAKE THIS FREE TEST!

60 years

Porcelain Products, Inc. PP INC.

FINDLAY, OHIO

member to watch the man behind the man in front of you!

Are grinding wheels properly installed? Goggles on to ward off sparks? That 435-lb barrel of grease: Are toes safe as it is being hoisted around the storage area? The innocent-looking circular saw in the carpenter shop; are your fingers protected? The squeezer mold machines, if they could talk, might say, "The hand you save could be your own!" And the pleasant little office fan near your desk, could there be a chance of breaking fingers as you carelessly swing around to pick up a fallen pencil? Do you go right away to the dispensary to treat a slight scratch, or wait a few days until infection has set in?

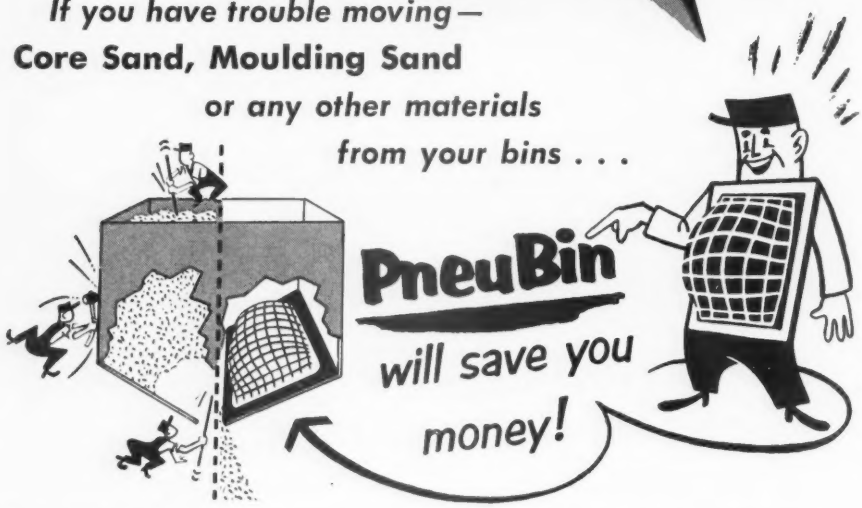
Often accidents happen in areas where there are no moving pieces of machinery, where everything is relatively quiet, like the binder store room, the pattern safe or the flask storage floor. Are we even more conscious of unforeseen hazards while sauntering through these places?

These 16 precautionary measures or "ounces" could be your "pound" of accident prevention. They could mean forestalling indefinitely an insurance check to your hospital for a concussion, a fracture or a punctured eye. They might mean averting many days in bed where "tons of cure" would have to be applied by your doctor or wife. And last of all, they might even prevent the receipt by your widow and orphans of your death benefit check.

Yes, we are living in the 20th century, a century of speed. Our foundries need this speed to produce more tons of castings at lower costs. But by the same token, every one of us needs his toes, fingers, limbs, eyes and every faculty of his body to keep abreast and do a good job. Accident prevention is one answer to the vital needs of our times. It begins at home, it goes to work with us, and it requires our every effort during the day's work, until we reach our families again at evening safe and sound. For their lasting benefit and our own, may we never forget the proverb, "A POUND of prevention is worth a TON of cure!"

PULSATING PANELS
eliminate flow stoppage in bins!

If you have trouble moving—
Core Sand, Moulding Sand
or any other materials
from your bins . . .



PneuBin will solve your flow stoppage problems and reduce your operating expense. The PneuBin unit consists of steel-backed, neoprene, pulsating panels mounted on the inside wall of your present bins and air controls to regulate the panels' action. By the pneumatic inflation and deflation of the PneuBin panels, the bin contents are positively displaced to insure free flow. After the panels have deflated, the air control unit (operating off the regular plant air supply) starts another cycle of inflation and deflation. The process continues *automatically* at whatever frequency is set on the air controller (this frequency is adjustable).

PneuBin decreases plant operating costs by reducing maintenance, insures constant material flow to production lines and greatly increases personnel efficiency through its quiet operation.

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Mexico Refractories Reaches Quarter Century Mark

Mexico Refractories Co., Mexico, Mo., is celebrating the 25th anniversary of its founding this year. The company was organized in 1929; plant construction was completed and its first shipment of firebrick was made in 1930. Mexico Refractories now comprises 5 manufacturing plants, 60 distributors, 18 sales offices and 240 dealers. Its products are sold all over the United States, in Canada and Mexico and in the port cities of Alaska, Hawaii, Formosa, Australia, India, South Africa, South and Central America, the Philippines and the West Indies.

Safety Training Aids Published

Three new safetygraphs are now available from the National Safety Council. The safetygraphs, "How to Control Bleeding," "First Aid Treatment for Burns" and "Transportation of Injured Persons," provide a ready means of training small groups.

Consisting of 12 spiral-bound pages, 18 x 24 in., the safetygraph can be set on any flat surface and opened to form an easel. Large, clear drawings are on the pages facing the audience; notes for instructors are printed on the back pages in easy-to-read type. Further information and prices may be obtained from the National Safety Council, 425 North Michigan Ave., Chicago 11.

Southern California: More than 170 members and guests were present Apr. 15 at Rodger Young Auditorium, Los Angeles, to hear George E. Miller, sales manager, San-Blo Division, Federal Foundry Supply Co., Cleveland, speak on "Sand Ramming by Blowing."

Mr. Miller stated hardness of blown cores is caused by mixture of the sand or by the velocity of air through the blow holes. Soft cores are caused by unvented or under-vented coreboxes or dirty vents. He suggested that a core be tried first with no vents since some air escapes at the parting line and it is difficult to know at first how many vents are needed. He concluded his talk by showing a number of slides of sand blowing applications.

Emile Peschke, apprentice committee chairman, presented cash prizes to winners of the apprentice molders contest. James Oliva, chairman of the contest committee for pattern-making apprentices, presented awards to the winners in that division.— *W. G. Stenberg, U. S. Electrical Motors Inc.*

New England: On Apr. 14 members of the New England Foundrymen's Association met at the University Club, Boston, saw slides and heard commentary on the modernization of the small foundry coreroom. Charles H. Barnett, Foundry Equipment Co., Cleveland was the speaker.

Association's annual golf outing will be held June 8 at Pawtucket Country Club. — *Alexander Beck, Whitman Foundry Inc.*

Twin City: Election of officers and a panel discussion featured the AFS chapter's Apr. 12 meeting at the Covered Wagon Restaurant, Minneapolis. New officers are: Chairman, H. H. Blosjo, Minneapolis Electric Steel Castings Co.; vice chairman, J. H. Roth, Progress Pattern & Foundry Co.; secretary-treasurer, Lillian K. Polzin, Minneapolis Chamber of Commerce. Directors for three years: D. B. Fulton, Northern Malleable Iron Co., R. J. Mulligan, Archer-Daniels-Midland Co., C. W. Sundberg, Minneapolis Electric Castings Co., and N. E. Wisner, Foundry Supply Co.

Panel discussion was on "Practical Quality Control." R. M. Ovestrud, Minneapolis Moline Co., was moderator of the panel which consisted of Mr. Blosjo; J. J. Upgren, Northern Ordnance Inc.; F. J. Birchem, Northern Malleable Iron Co., and Ralph Brown, Minneapolis Moline Co. Each panelist outlined quality control practices followed in his shop. Many principles were common to all.

Need for co-operation of all personnel concerned with making castings was stressed. They must appreciate the objectives of quality control and

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realize the mutual benefits from producing sounder and more saleable castings. Panel agreed that quality control in operation involves establishing practicable specifications for a particular job and then adherence to the specifications. Panel also agreed that written records were indispensable in analyzing casting problems when they arise in the future.— *R. J. Mulligan, Archer-Daniels-Midland Co.*

Northwestern Pennsylvania: Foundry engineering course offered by Pennsylvania State University was described by Prof. David C. Ekey at the April meeting of the AFS chapter. Guests present included Thomas Kaveny Jr., past president FEF; Dr. W. Winter and Thomas Campbell, Penn State; J. F. Anthony, principal, Erie Technical School; H. C. Gillespie, principal, Strong Vincent High School; Dr. Leroy Baker, Academy High School and Dr. M. E. Kolpien, superintendent, Erie County Schools. Mr. Anthony told of plans for a foundry in a new million dollar Erie Memorial Technical School.

Bailey D. Herrington, Hickman, Williams & Co., chapter chairman, announced the following nominations for chapter officers for 1955-56: Chairman, Jake Diemert, Erie Castings Co.; vice chairman, Robert Johnson, Bucyrus-Erie Co.; secretary, E. J. Bonestell; treasurer, Richard Strong, Griswold Mfg. Co. Directors to serve three years: John Considine, Griswold Mfg., Alexander Wightman, Lakes Laboratory and Walter Clemons, Meadville Malleable Iron Co. Mr. Herrington was appointed to the Board for one year. —*Roy A. Loder, Erie Malleable Iron Co.*

Washington: "Sand Ramming by Blowing" was discussed by George E. Miller, Federal Foundry Supply Co., Cleveland, at the Apr. 21 meeting of the AFS chapter held at the Block House, midway between Tacoma and Seattle, Wash. Several posters were shown, diagramming the mechanics of blowers and explaining their terminology.

While there is no sure formula for the size or number of blow holes required, they should be large enough to give free flow of the stiffest sand used and it is preferable to use a large number of small diameter blow holes rather than a small number of larger holes. Mr. Miller suggested that there be 1 sq in. of blow hole area for every 7.6 lb of sand in the core and that the vent area be six times the blow hole area. He said the velocity of the sand entering a corebox controls the hardness of cores,

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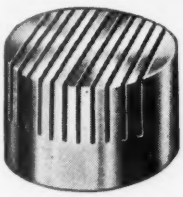
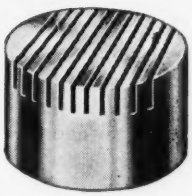
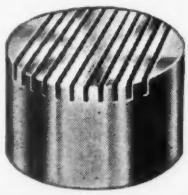


X-TRA DEEP HEAD .156 Wide Slots .014

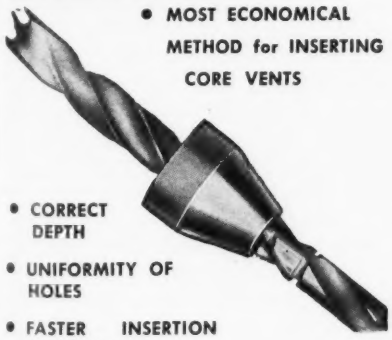


DEEP HEAD .093 Wide or Narrow Slots .014 .010



SHALLOW HEAD .031 Wide or Narrow Slots .014 .010

INSERTING DRILL



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and soft cores are usually due to insufficient venting.

Mr. Miller believes mold blowing is the future method of producing molds for smaller castings. His company has been successful in blowing molds up to the size required for 26-in.-square flasks. He claims the following advantages: Accurate reproduction of patterns, tolerances 0.005-in. plus or minus; equal pressure in all directions; no spilled sand, thereby eliminating spill conveyors; no molding machine foundations and quiet operation.—*William K. Gibb, Atlas Foundry & Machine Co.*

Pittsburgh: A thorough revision of the group's constitution, and nominations of officers for next year, were included in the program of the Apr. 18 meeting of the Pittsburgh Foundrymen's Association. Speaker was Charles Christopher, Continental Foundry & Machine Co., who discussed physical testing of cast steels at elevated temperatures. "Hot tearing is a serious problem," he commented, describing it as a physical phenomenon which can be attacked in several ways. Tearing will occur above a certain temperature and pressure range regardless of how steel is made, he added. Mr. Christopher concluded by showing and commenting on results of testing metals in his research.—*Robert M. Love.*

Chicago: The AFS chapter elected and installed new officers for 1955-56 at its regular meeting May 2 at Chicago Bar Association. Nominations had been reported at the April 4 meeting (May FOUNDRY, May, p. 274) and no additional nominations having been submitted, the election was declared unanimous.

Retiring president Robert L. Doelman, sales engineer, Miller & Co., presided and summarized activities of the chapter during the past year. He then introduced President-elect James T. Moore, vice president, Wells Mfg. Co., who for the past year has been vice president and program committee chairman.

Installed as new officers with Mr. Moore were Robert P. Schlauss, Chicago manager, Werner G. Smith Co., as vice president; Daniel R. Jones, sales, Illinois Clay Products Co., as secretary to succeed himself; and four directors.

In making his report as chairman of the membership committee, Clifford Sorensen, plant metallurgist, National Malleable & Steel Castings Co., explained that in latest accounting the Chicago Chapter had fallen to second place in national standing, having yielded to the Northeastern Ohio

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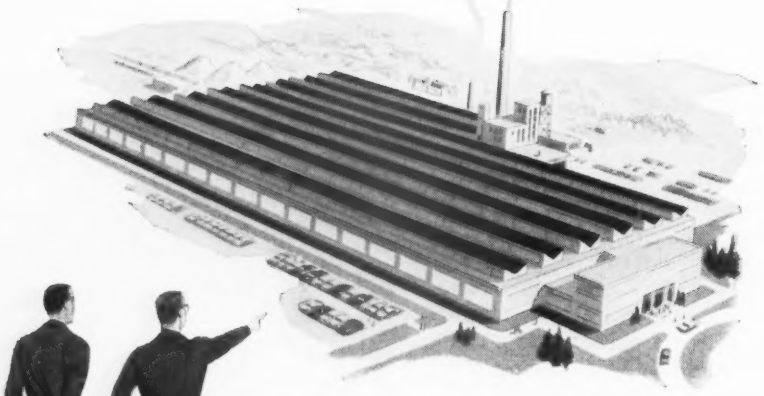

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Chapter. Mr. Sorensen stated he had "lost his shirt" in the encounter and proved it by removing his coat to reveal a bare back on which was imprinted in red the figure "695."

It was announced that the chapter's annual stag outing will be held at Lincolnshire Country Club, Crete, Ill., on Saturday, Aug. 6.

The more than 150 members and guests in attendance were rewarded with an interesting and informative talk on "Casting the Wonder Metal Titanium." The speaker was J. Harry Jackson, manager, department of metallurgy, Battelle Memorial Institute, Columbus, O. Lyle L. Clark, Armour Research Foundation, presided over the session.

Mr. Jackson showed a color movie on titanium prepared by Frankford Arsenal, pointing up the difficulties in melting and pouring and in mold materials.

In the opinion of the speaker, titanium has been oversold although it does possess properties and attributes for certain applications despite melting and molding drawbacks. It has a useful function up to about 800° F, which is somewhat lower than originally expected. Up to now, castings produced have not gone much above 10 lb, but castings up to 40 lb are about to be made commercially. Uses so far are almost entirely in military work, as would be expected with the government the principal sponsor of research.—*Erle F. Ross.*

British Columbia: G. E. Miller, Federal Foundry Supply Co., Cleveland, discussed "Sand Ramming by Blowing" with 38 members and guests of the AFS chapter at the regular technical session held Apr. 22.

Four educational meetings were staged during the month on succeeding Wednesday evenings. Arranged by J. McCullough, Canadian Sumner Iron Works Ltd., the first was held Apr. 6 at Vancouver Vocational Institute. Prof. William Armstrong, University of British Columbia, gave the definition, use and advantages of the Vickers, brinell, Rockwell, transverse, tensile and impact tests. Castings supplied by local foundries were subjected to the tests.

Second session featured R. Davies, General Refractories Co., San Francisco, who showed a motion picture on production of fire brick. He concluded with a panel discussion on various grades of fire brick and basic refractories. Following week a panel discussion on sand mixing, properties and control was held. Sam Stewart, Canadian Sumner Iron Works Ltd., Gordon H. Frankworth, Georgia Foundry Ltd., James Sturrock, Asso-

ciated Foundry Ltd., were panel members with Lovick Young, A-1 Steel & Iron Works Ltd., serving as moderator.

Concluding session, arranged by Addison Steeves, Scott-Foster Ltd., dealt with cleaning and welding of castings. Mr. Steeves discussed grinding wheels, P. R. Mailtand, Dominion Oxygen Co., covered use of cutting torches with powder nozzle adaptors, using iron, aluminum and sodium carbonate powders, and J. A. Lindsay, Scott-Foster Ltd., spoke on arc-air process and arc welding.—*J. T. Hornby, Balfour-Guthrie (Canada) Ltd.*

San Antonio Section: Meeting Apr. 25, 20 members and guests were present to see a safety film, "A Gray Day for O'Grady," shown at the Alamo Iron Works. This was followed by a general discussion of modern production molding. Meeting adjourned with refreshments provided by courtesy of the Alamo Iron Works. —*George H. Hartwell.*

Northeastern Ohio: About 200 members of the AFS chapter turned out at the Tudor Arms Hotel, Cleveland, on Apr. 14 to honor national officers and apprentices. David Clark Jr., Forest City Foundries Co., chapter chairman, presided.

Frank J. Dost, Sterling Foundry Co., national AFS president, spoke briefly and reviewed the history of the Northeastern Ohio chapter and its impact upon the national organization. The Northeastern Ohio chapter has supplied seven national presidents, 25 directors, and nine medalists and honorary life members.

E. C. Hoenicke, Eaton Mfg. Co., Vassar, Mich., national regional vice president, and president of the Foundry Educational Foundation, discussed the highlights of the past year as entailed in the reorganization of the AFS national organization.

Frank Cech, Cleveland Trade School, national director, reminisced about his foundry experiences with brief remarks about the educational program of the chapter.

D. C. Courtwright, principal, Cleveland Trade School, and J. Fintz, assistant superintendent, Cleveland Board of Education, spoke briefly about the plans for the new Cleveland Trade School and its vocational program.

Awards were presented to these winners in the chapter's annual apprentice contest: Wood Patterns—First, Edward Lamparyk, Modern Pattern Co.; second, Lewis Backus, Cleveland Standard Pattern Works; third, Vincent Vineziano, Model Pattern Co. Metal Patterns — First,

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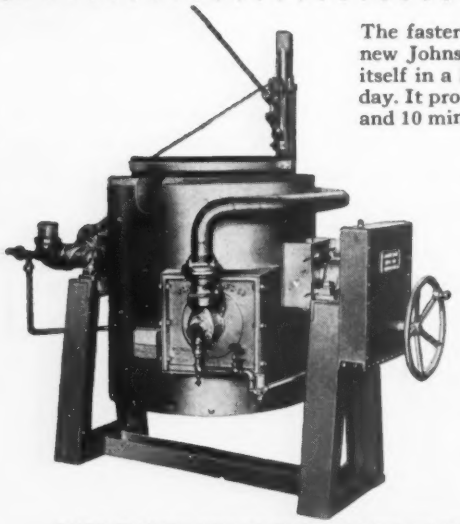

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Dougherty Lumber Co., awarded duplicate checks to the patternmaker winners.

Gilbert J. Nock, Nock Fire Brick Co., chairman of the nominating committee, announced the following nominees for officers for 1955-56: Chairman, Lewis T. Crosby, Sterling Wheelbarrow Co.; vice chairman, Alexander D. Barczak, Superior Foundry Inc.; 2nd vice chairman, E. Claude Jeter, Ford Motor Co.; secretary, Howard E. Heyl, Federal Foundry Supply Co.; treasurer, Harold Strater, North American Refractories Co. Board of directors, three-year term: Walter H. Siebert, Cleveland Standard Pattern Works; Norman J. Stickney, Sand Products Co.; Robert H. Herrmann, FOUNDRY; A. H. Hinton, Aluminum Co. of America; Fred S. Green, Elyria Foundry Div., Industrial Brownhoist Co. J. H. Tressler, Hickman, Williams & Co., was nominated to fill the unexpired directorship of the late Arthur H. Harlan. David Clark Jr., chapter chairman, was nominated a director for one year.

A motion picture, "Man with 1000 Hands," was shown to conclude the meeting. The film emphasized the immense and complex engineering problems overcome in construction of a tremendous aluminum smelting plant for Aluminium Ltd. in the wilds of British Columbia.—*Kenneth L. Mountain.*

Metropolitan: Harold Bishop, Naval Research Laboratory, Washington, talked on "Feeding of Castings" at the Apr. 4 meeting of the AFS chapter at Essex House, Newark, N. J., with 150 members and guests attending.

Mr. Bishop discussed proper positioning of feedheads, use of chills and degasification of the melt as three major factors influencing casting soundness. Mode of solidification of castings was described and illustrated by schematic drawings, and charts were shown of solidification data secured from studies of steel, gray iron, bronzes and aluminum alloys.

In discussing risering, Mr. Bishop presented mathematical data covering riser dimensioning, location and

feeding range factors, as well as other phenomena associated with effective feeding of steel, manganese bronze and ductile iron. Location of chills to extend the feeding range of steel risers was covered as well as vacuum degassing techniques.

B. N. Ames, Columbian Bronze Corp., technical chairman of the session, presided over a lengthy discussion period. Charles Schwalje, Worthington Corp., chapter chairman, presented the recommendations of the nominating committee for officers for the coming year.—*Seymour B. Donner, Cooper Alloy Corp.*

Birmingham: Members of the AFS chapter joined with the University of Alabama student chapter on Apr. 15 for their regular monthly meeting. The university foundry at Tuscaloosa, Ala., was the site with over 100 members present. Following a barbecue luncheon, a film on desulphurization and upgrading of iron was shown through courtesy of Linde Air Products Co. A practical demonstration of the process, involving the injection of carbide, cerium and magnesium into electric furnace melted gray iron was carried out in the foundry. T. W. Harwell, southern region engineer for Linde, directed the demonstration. John R. Condra is student chairman of the university chapter.—*J. A. Wickett, U. S. Pipe & Foundry Co.*

Connecticut: Nonferrous Foundrymen's Association met Apr. 20 at Quinnipiack Club, New Haven, Conn., for a panel discussion meeting. Walter Helmadach, foundry superintendent, Wilcox Crittenden Co., Middletown, Conn., served as moderator of the panel and introduced panel members and their topics.

James J. Shannon, metallurgist, Jenkins Bros. Co., Bridgeport, Conn., spoke on "Metallurgy and Technical Control," with emphasis on the importance of conforming to government and customer requirements as to chemical and physical properties of alloys. Constant technical and laboratory control of sands, refractories, alloys and allied materials was emphasized.

James Manzolli, superintendent, Brass Foundry, Waterbury Mfg. Co., Division Chase Brass & Copper Co., Waterbury, Conn., related some "Production Brass Foundry Problems." He touched upon sand specifications, foundry equipment and laboratory facilities for investigating defects in castings.

Curtis Peasley, president, Peasley Products Co., Stratford, Conn., talked on "Aluminum Castings." Aluminum practice is similar to that of brass

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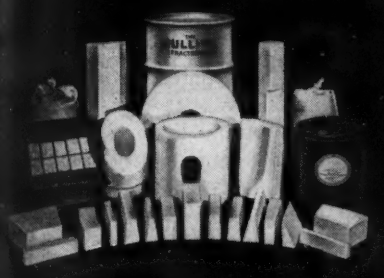

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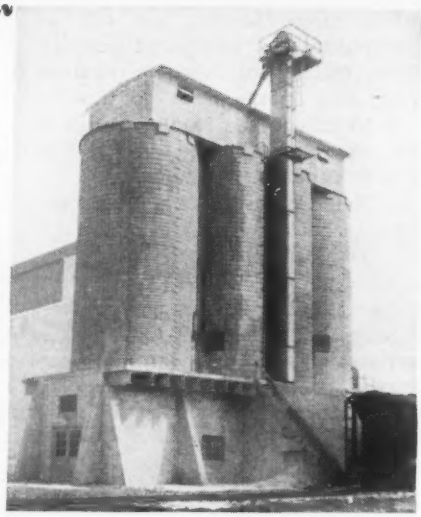

You see four bins in the photograph. There are two more of the 12 ft. dia. bins between the 20 ft. ones. All six are used for handling glass batch materials—lime, feldspar, silica sand, cullet, etc.

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except that lower temperatures prevail with some variations in molding and core sands, depending upon casting design. Pouring temperature control and prevention of gas absorption were stressed as vital to production of superior castings.

George Laask, president, Stamford Castings Co., Stamford, Conn., chose "Magnesium Castings" as his subject and described the melting of magnesium-base alloys in iron pots. Green molding sand is treated with inhibitors, such as sulphur and boric acid in combination with glycol. This operation uses brass patterns and speaker pointed out some differences in gating as well as fluxes required during melting. Good housekeeping practices and constant vigilance are essential to avoid fires, particularly in conjunction with grinding of castings.—*Frank B. Diana.*

Wisconsin: Hotel Schroeder, Milwaukee, was the scene of the April meeting of the AFS chapter at which five sectional meetings made up the program. Officers and directors for 1955-56 were elected: President, P. Charles Fuerst, Falk Corp.; vice president, Prof. George J. Barker, University of Wisconsin; secretary, Norman J. Amrhein, Federal Malleable Co., and treasurer, Bradley H. Booth, Carpenter Bros.

Directors elected for a three year term were Robert F. Osborne, Lakeside Malleable Castings Co., retiring president; Thomas H. Tanner; Prof. Richard W. Heine, University of Wisconsin, and James A. Arter.

At the malleable session, John D. Wozny, process engineer, American Sheet Steel Co., discussed "Arc Air Washing." Erich Sobota, Wisconsin Electric Power Co., acted as chairman. Gray iron group heard C. V. Nass, vice president, Beardsley & Piper Division, Pettibone Mulliken Corp., talk on "Mechanization in the Small Foundry." Eric Wussow, Kaukauna Foundry & Machine Co., chairmanned the meeting.

A. F. Pfeiffer, Allis-Chalmers Mfg. Co., addressed the nonferrous section on "Pattern Problems." Otto A. Sadofsky, Kenosha Brass & Aluminum Co., was chairman. "Proper Plastics and Their Results in Patternmaking" was discussed by J. P. Delorme, Kish Plastics Products Co., Lansing, Mich. M. C. Ehrman, International Harvester Co., acted as chairman for this group.

Scrap clinic heard a panel discussion with R. W. Heine moderating. Panel consisted of H. Zellmer, Chain Belt Co., H. Gross, Belle City Malleable Iron Co., and J. McIlhone, International Harvester Works, Waukesha, Wis.—*John E. Hubel.*

Meditations of a Sandman

By HAROLD E. HENDERSON
H. C. Macaulay Foundry Co.
Berkeley, Calif.

"Tell 'Em Nothin'!"

AN EXPRESSION once current in certain circles of a questionable society was intended as advice to a young man in search of a wife: "Get 'em young, treat 'em rough, and tell 'em nothin'!" That philosophy undoubtedly died with the ducking-stool. Occasional evidence of such an attitude existed, however, even during my period of foundry apprenticeship, and as I recall, the boys who were so treated either deserted the trade or became something less than mediocre mechanics. Their length of stay in the foundry depended mainly on the thickness of their hides.

Secrecy seems once to have been regarded as the priceless ingredient of good foundry practice. Only the boss knew the why and wherefore of his casting process, and he guarded them jealously. His employees were expected to do as they were told, without having the remotest idea why it was being done or of the principles underlying the *modus operandi*. It was an atmosphere of distrust in which the boss was deadly afraid that his "secrets" might be handed to a competitor. But, since distrust breeds distrust, the more intelligent and inquisitive workers soon uncovered the coveted formulae, and secrecy ended right there.

At a regional conference recently held at Pasadena, Calif., your garrulous correspondent presented a sand talk pretentiously entitled, "Basic Principles of Sand Control." The question period which followed was for the most part questionless. Either the presentation proved so elementary that there was nothing to question, or the thing was so radical that my friends decided to maintain a protective silence. There was, however, one brief flash of opposition which brought joy to my heart. My dissenter was and is a prominent foundryman of the Los Angeles area who is deservedly respected in the

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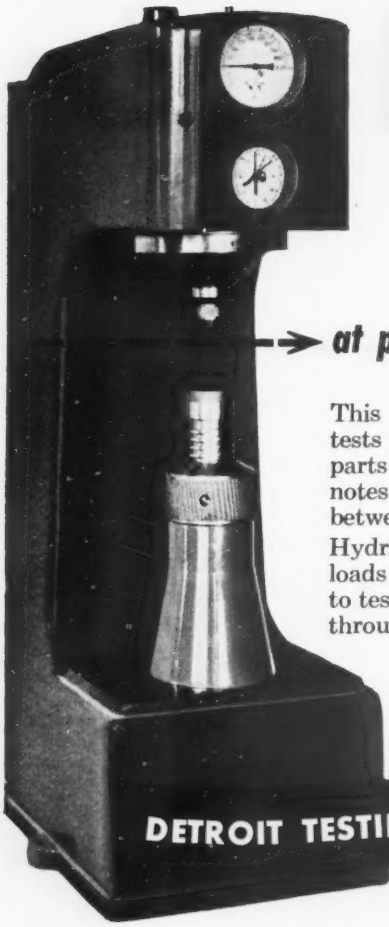

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industry. He is, as far as I know, morally and intellectually of high character, with a decidedly modern outlook. Because of these facts, I consider his statement important.

I had argued at considerable length that our educational program did not go far enough, that our sandmen especially were being sadly neglected. I repeated the oft-quoted remark of Charlie Schureman: "We select with care, and pay top wages to our mechanics, and then have low-paid, low-grade laborers on our mullers."

I was feverishly attempting to establish my point that the man at the muller can confer greater benefit or damage on your daily production of castings than anyone else in the shop, with the possible exception of your melter. It was my insistence that this sand-mixer should be well paid and well treated and that he should be educated for his job by every means available and to the full extent of his capacity. I would have him clearly understand what he was doing and how and why he was doing it. If he could read, I would provide him with all available literature pertaining to sand study and control, and I would do everything within reason to encourage his interest in this most important department of the foundry.

Perhaps I became over-zealous in expounding my pet theory and thus aroused the ire of the opposition. At any rate, my friend took the floor and, without raising his voice in the least, insisted that he could not agree on this matter of educating a muller-man. He said that he expected his muller-man to do as he was told and that no more was required of him. He implied that to educate this individual would be a waste of both time and money and would probably defeat the purpose.

I don't remember just what I said in reply to my friend, but it was probably both weak and facetious. Since then, however, I have endeavored to explore his side of the argument, and I must concede that it is not without merit.

Many men undoubtedly are mulling sand who are paid to do as they are told. They may be totally incapable of understanding the printed word. They may be devoid of imagination or analytical ability, yet they prove completely dependable in following orders to the letter, day after day. They may have all the education they need, want or are capable of responding to or absorbing. They may understand and readily respond to the simple command—so

long as it is kept simple!

Now for each of these men who is not paid to think, a foundry must have someone who is. Someone must be qualified to give the detailed orders and, incidentally, be responsible for the results. This second person should have all and more sand education than I request. He must do the thinking for his man at the muller.

This collaboration of mind and muscle is ideal if one has available replacements in each division. I thoroughly approve the idea of teamwork on sand control—a man at the muller and a sand technician. The latter is to do all testing, keep regular and explicit records, check casting finish and sand behavior daily and order such changes in the sand mix as may be deemed necessary. This person also should be capable of making simple experiments and of devising core and mold mixtures capable of producing competitive casting results.

The word "educate" literally means to "draw out," not to force in. It should not be too difficult to get some idea of the mental potential of a muller-man and to decide whether it warrants development. It would, of course, be the height of folly to confuse him with academic theories or even with technical terms which become an entirely new language to him and prove completely discouraging. Avoid this by all means, but at the same time don't deny him the opportunity to learn the basic principles of sand preparation.

Certainly he is not incapable of knowing sand and additives by name and of knowing what presumably happens when he substitutes one clay for another, changes the pitch, seacoal or wood flour ratio, varies the percentage of water in the mix or increases or decreases mulling time.

This information should be the first chapter in a sandman's primer and should be learned after the manner of catechism. I wouldn't give him test tubes or slide rules, but I would attempt to develop his empiric understanding to a point where he could explain clearly and convincingly what he was doing and why he was doing it.

The sand technician may get sick, or be absent for other reasons, and the muller-man should know precisely what to do when molders complain of sand behavior. I think it's about time that Schureman or Sanders or Brewster should write a handbook for my man at the muller.

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nothing but praise for the REDA FURNACE . . .

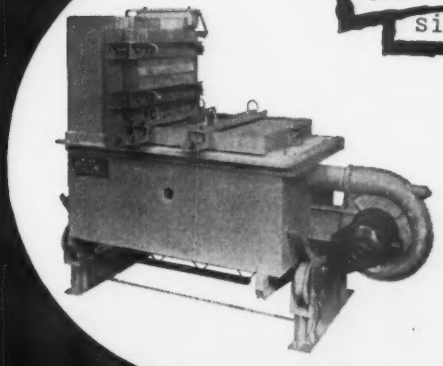
has improved overall foundry operation . . .

doing a wonderful job . . .

much more flexible . . . entirely satisfactory .

castings come cleaner . . .

sincerely recommend it . .



Reda Stack-Loading melting furnaces for ferrous and nonferrous metals have been designed and built by experienced foundrymen for foundrymen everywhere. That is why Reda furnaces provide advantages far beyond those found in other, and more expensive types; that is why, with Reda furnaces there is less down time for maintenance, longer uninterrupted melting runs, and lower melting costs.

Another feature is the Reda Burner arrangement which can operate from oil and gas simultaneously or be switched from one fuel to the other instantly. *Write or phone for complete details.*

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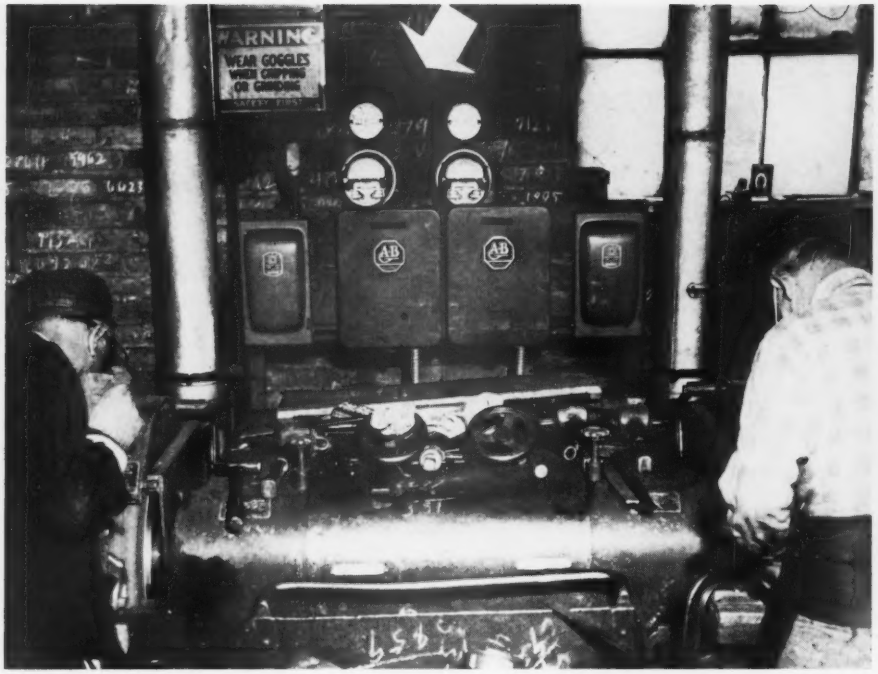


Arrow at top of left illustration points to energy unit measuring devices. Arrow in view on right points to fabricated gravity chute equipped with counter

A Way To Measure Grinding Costs

By EUGENE W. MATTE
Supervisor of Standards
A. C. F. Industries Inc.
Detroit

DETERMINATION of foundry cleaning room standards and unit costs is complicated by the number of variables involved. These variables include:

1. Extra grinding because of drops and excessive fins.
2. Variations in heights of riser pads and fins because of improper cutoff by gas torch or cutoff wheel.
3. Variations in fin removal according to type of cleaning employed before grinding.
4. Necessity of grinding off jagged pads caused by knocking off risers when castings are hot.
5. Extra grinding for large welds and excessive penetration.

Confronted by these problems, our company sought a tool to aid us set up uniform standards. We found it in the Workometer, a product of Stewart Instrument Co., Detroit.

The Workometer is a measuring device connected into the circuit of an electric-motor-driven machine. Units of measure—work or energy units—consumed by the driving motor in producing useful work are directly proportional to the operator work on hand-operated machines.

The instrument actually measures work performed. Pressure applied to a grinding wheel places a greater load on the grinder motor so that more current is required. This variable current load is registered on the Workometer.

One of the instruments was installed near each cleaning room stand grinder and a Hart counter was attached to a fabricated gravity chute at each so that castings were counted as the operator disposed of them. This arrangement gave us two measuring devices. The Workometer measured energy units or grinding time, and the Hart counter registered the number of pieces ground.

A daily record was made of energy units and pieces per operator. It was noticed readily that as the number of energy units increased the number of pieces decreased and vice-versa. Discovery of this action permitted us to establish a basis for a variable.

At this point, time studies were taken on all operators to determine grinding and handling times for all sizes and types of castings. At the same time, energy units and piece counts also were being recorded.

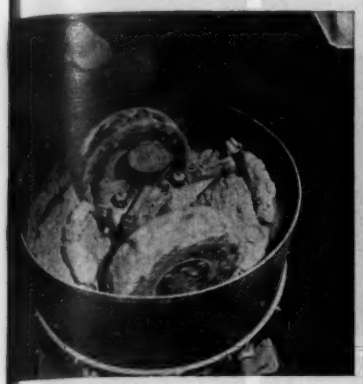
With this information, a day-work standard was developed. The Workometer measured and registered the amount and duration of pressure applied to the grinding wheel and recorded the data in energy units. The number of pieces ground reflected handling time per casting.

A production standard of 700 standard units was established. This figure was the sum of energy units plus handling units per casting ground (a handling unit is an equivalent of handling time converted to a unit) times the number of castings ground. For example, if A equals the meter reading, B equals castings handled, C equals allowance in units for handling and D equals standard units per day, we arrive at this formula: $B \times C + A = D$.

For the first two weeks the standards were in effect, the operators questioned whether allowances had been made for handling different castings, flogging fins, hard-grind wheels, etc. With the elimination of some excessive personal time, they answered the questions by coming up to standard without undue fatigue. The question of extra grinding time caused by drops, excessive fins, improper cutoff and different

PROVED SUPERIOR

ACME RESIN



1 MULLING, tacky stage. Cold sand, liquid resin, and catalyst are charged into a standard muller.

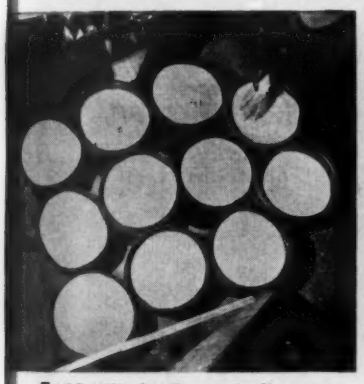
2 MULLING, free-flowing stage. Each grain of sand *uniformly coated* —no critical control necessary.

3 DISCHARGING. Sand is *dust-free*, cannot segregate from resin, green strength is controllable.

4 TWENTY-POWER magnification of resin-coated grains of sand after mulling process.

PlastiSand® PROCESS

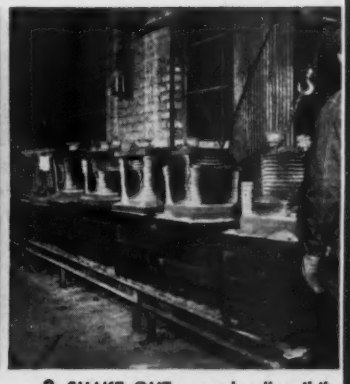
Resin formulation and the coating process covered by Patents 2,706,163 *and* 2,706,188



5 COATED SAND, ready for use. Extremely *high tensile strength* at resin contents of from 2% to 4%.

6 BLOWN SHELL CORES. *Non-segregating* qualities lend themselves perfectly to shell and core blowing techniques.

7 STACK POURING of Alnico magnets, 12 to 16 high. 2% of resin produces necessary *high strength*, saves time and space.



8 SHAKE OUT—good collapsibility makes for easier shake out and better cleanup.

Pictures courtesy Mr. Raymond Kelly, Superintendent, Arnold Engineering Foundry, Marengo, Ill.

PROVEN MULLERS ON THE "COLD PROCESS"	SIMPSON "Mix-Muller" BEARDSLEY & PIPER "Speed-Muller" and "Mulbarow" BAKER-PERKINS "Unidor" CLEARFIELD "Muller"
PROVEN MULLER ON THE "HOT PROCESS"	BEARDSLEY & PIPER "Shell-Sand Speed-Muller"

PLASTISAND Process utilizes a revolutionary new method for coating sand with liquid-resin for foundry shell molding.

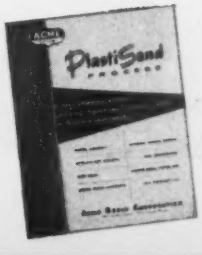
This new development by Acme Resin Corporation in the field of shell molding has several positive advantages that overcome the primary deterrents to the use of the more widespread "C" or shell molding process.

Foundries using the PLASTISAND Process report PROVED SAVINGS, PROVED SAFETY and PROVED SUPERIORITY of molds with as little as one-half the resin content formerly necessary with dry resin.

With the PLASTISAND Process, a shorter dwell is possible and a faster cure is assured, from a shorter time on the pattern and a faster baking cycle.

Acme's new PLASTISAND Process is adaptable to dump-box, roll-over and blowing of either shells or cores. It uses either hot or cold mulling—in both. Acme liquid resin is used.

An informative folder has been prepared to better acquaint the foundry industry with the new PLASTISAND Process. It may be obtained by writing to the ACME RESIN Corporation at the address listed here.



ACME RESIN CORPORATION

1401 CIRCLE AVENUE • FOREST PARK, ILLINOIS

methods of cleaning before grinding never arose because the Workometer records all grinding time, giving the operator full credit for any extra work.

Operator efficiency increased from 70-80 per cent to 100 per cent. In addition, the men had a reasonable production standard and an instrument to measure a fair day's work.

A piece rate standard also can be established when the Workometer is used only as a measuring stick, especially when size and type of casting are uniform. Over a period of time, one can record the energy units for each operator and note his performance. Through an evaluation of this information, a suitable piece rate standard can be determined.

Use of the instrument results in another saving in that a foreman is not required to supervise the grinding department. A load of castings is positioned conveniently near the grinder, who then grinds them and disposes of them in another box. Recording and computation of efficiency are done by the timekeeper, eliminating any need for a supervisor.

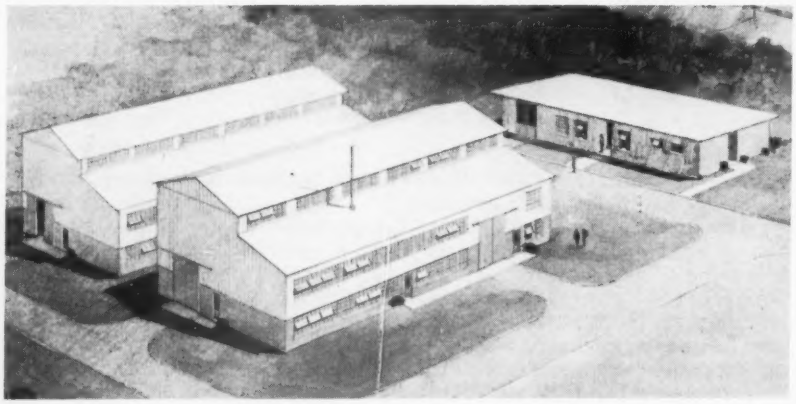
The instrument also enables a company to find the unit grinding cost. Three steps are involved. First, find the amount of metal ground from a casting by weighing it before and after grinding. At the same time, record energy units. Second, divide the energy units by the pounds of metal removed to find the standard units per pound. Third, from the standards established, determine the cost of each standard unit by dividing the base rate by the standard energy units. When one knows the cost per standard unit, the energy units per pound and the pounds removed from a casting, the grinding cost can be figured.

For example, consider how to discover the cost of removing 0.4 lb of metal from a casting when the base rate is $16 and standard units per day are 700. To find the standard units per pound, divide recorded energy units—in this case 4—by the weight removed, or 0.4 lb. Standard units per pound are 10. Cost per standard unit is the base rate, $16, divided by standard units per day, 700. Cost per standard unit is $0.02286. Cost of removing 1 lb of metal is 10 standard units, as determined above, times 0.02286, or $0.2286. Cost to remove 0.4 lb of metal is 0.4 × $0.2286, or $0.0914.

Savings also can be accomplished in the area of grinding wheel efficiency. By usual piece work standards, the operator gains if the grinding wheel is softened because he then can grind more pieces per hour. The company, however, loses because of the shorter wheel life. With the Workometer, the operator does not gain unless his work is above standard, and the company gains the increase in production.

Other savings also can be realized through use of the instrument. It eliminates costly time studies for piece-work price approval, new jobs coming into the shop and jobs that have had equipment changes. It further eliminates the need for rework operations because the operator is credited for all grinding for any condition of the casting. Usefulness of the unit extends to such other equipment as swing grinders, shot blast and tumbling machines and welding and special slab and billet grinders.

Battelle Builds New Laboratory Buildings



NEW LABORATORIES located near Columbus, O., have been built by the Battelle Memorial Institute to make large-scale studies in chemical engineering, metallurgy and minerals processing. The building in the foreground and the one on the extreme right have been completed. The building on the left of the architect's drawing is the first of a contemplated series of future buildings which will be built to fill specific industry needs. Included among the facilities of the new buildings is a 500-KVA, three-phase transformer, equipped with automatic controls, planned for use with a 1000-lb capacity direct-arc furnace for melting of steel and other ferrous alloys.

Strategic Planning Techniques Are Applied to Industry

Techniques of strategic planning, first used by the military, now are being applied at the top planning level in industrial operations. Known as operations research, these techniques take much of the guesswork out of selecting and plotting courses of action and afford an informed basis for making important decisions.

A report just made available to industry by the Office of Technical Services shows how operations research works. It was prepared by Johns Hopkins University under contract with the Department of the Army.

Title of the report is "The Application of Operations Research to Industry." Copies may be ordered from Office of Technical Services, U. S. Department of Commerce, Washington 25. Order PB 111596. Price is $1.75 per copy.

Reports Cover Investment Casting, Stainless Steel

Investment casting and stainless steels are the subjects of two recent reports available from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

"Investment Precision Casting," PB 111001R, summarizes references to the process in technical magazines and books as well as in government reports and patents from 1933-1954. It also describes production methods and materials and includes a 192-item bibliography. Price is 75 cents.

"Correlation List of American and European Composition of Stainless Steel," PB 111549, gives American Iron & Steel Institute specifications for 33 types of stainless steel and, by manufacturer, compares standard AISI compositions with principal European steels from Austria, Belgium, Czechoslovakia, England, France, Germany, Norway, Sweden and the U. S. A. Price is 50 cents.

LIKE FINDING GOLD!

That's the way it's been—for foundries that have changed to CUT STEEL during the past year. For this amazing, new type abrasive is *making money* for these foundries, by doing an incredibly better job of cleaning *and* drastically reducing cleaning costs. You see, CUT STEEL is actually *cut* from high quality, alloy steel—which gives it properties and advantages possessed by no other abrasive. If you haven't tested CUT STEEL in your cleaning room—you should! It's like finding gold!

Grade "A" CUT STEEL sells for less than most cast steel shot!
Grade "B" CUT STEEL costs no more than most malleable shot!

Sooner or later, you too, will change to CUT STEEL!

CUT STEEL
ABRASIVE

ANNEALSHOT and SUPER-ANNEALSHOT

PRODUCTS OF

METAL BLAST, INC.

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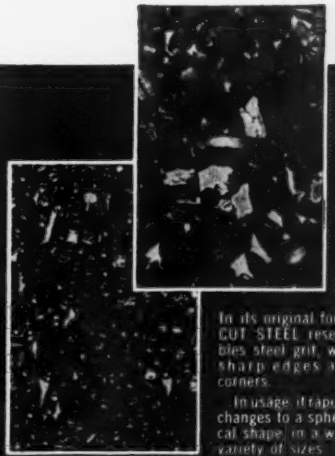

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In usage it rapidly changes to a spherical shape, in a wide variety of sizes.

PRODUCTION UP 400%

No wonder they call it . . .

SUPER TAMASTONE

● This SUPER TAMASTONE Match Plate is made from 3 loose patterns with gates and risers for nickel alloy casting. By converting these loose patterns into an economical combination run, the foundry was able to obtain uniform and proper gating and realized more than 400% production increase!

Super Tamastone will work wonders in your foundry too! Write!

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LOW COST

SMOOTH-FLOWING ACTION

in the foundry

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Write for information so that you too can plan your own conveyor system.

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extra heavy, standard, and light

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For More Details Use Reply Card—Page 187

MELTING FURNACES: Stroman Furnace & Engineering Co., 9900 Franklin Ave., Franklin Park, Ill.—Company's line of melting furnaces and foundry equipment is partially illustrated in catalog 800. Some of the items covered are stationary lip pour crucible melting furnaces either mechanically or hydraulically tilted, dip out furnaces, iron pot melting furnaces, melting and holding furnaces for nonferrous metals, die casting furnaces, reverberatory furnaces, core ovens, oil burners and centrifugal blowers.

For More Details Circle No. 141—Page 187

TIRES: Notat Tire Co., P. O. Box 1814, East Lake Station, Chattanooga 7, Tenn.—Folder describes industrial tire for use on cranes, tractor-shovels, fork lift trucks, tractors or other equipment. Tire is of laminated construction and has no tube, eliminating punctures, blowouts, flats and downtime on tire-equipped machines. Tires can be supplied to fit any split wheel or flat base rim or wheel.

For More Details Circle No. 142—Page 187

CORROSION PREVENTION: Solvay Process Division, Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.—Detailed information on use of sodium nitrite as a rust and corrosion inhibitor is presented in booklet entitled "Sodium Nitrite for Rust and Corrosion Prevention."

For More Details Circle No. 143—Page 187

SILICONE PAINT: C. H. Dragert Co., 2518 Chalk Hill Rd., P.O. Box 5092-L, Dallas, Tex.—Illustrated brochure covers a heat, rust and corrosion-resistant silicone paint for red-hot surfaces that withstands 1600° F and exposure to extreme weather conditions.

For More Details Circle No. 144—Page 187

PALLETS: Union Steel Products Co., 242 Berrien St., Albion, Mich.—Clearance standards, construction features, accessory and specification data on several types of pallets are presented in well-illustrated form MHP-104.

For More Details Circle No. 145—Page 187

DYE PENETRANTS: Turco Products Inc., 6135 South Central Ave., Los Angeles 1, Calif.—"Flaw Location by Dye Penetrants" is a 12-page booklet detailing an inspection method on any metal by use of dye penetrants.

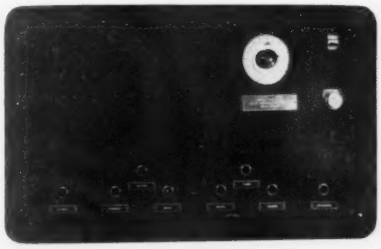
For More Details Circle No. 146—Page 187

WOODWORKING MACHINERY: DeWalt Inc., Lancaster, Pa.—Booklet, "New Ways to Make Money on Your Cutting Jobs," points out various ways in which woodworking machinery can reduce costs and increase

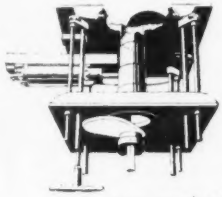
Hartley

AUTOMATIC SAND CONTROLS *REDUCE SCRAP, INCREASE SAND PRODUCTION, AND PAY FOR THEMSELVES*

HARTLEY HYGRO-GUIDE
Will automatically control the moisture in your prepared molding sand

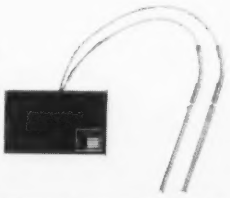


HARTLEY TIME GUIDE
Will automatically control all phases of the mixing cycle



BOND GUIDE
Will meter and charge dry bond and carbonaceous material automatically

SAND LEVEL CONTROL
assures the molder a constant sand supply



HAYLCO CONTROLS
Corporation
NEENAH, WISCONSIN
The original manufacturer of automatic controls for sand systems.

profit margins. Some topics covered are floor space savings, installation costs, obsolescence, operator fatigue and general efficiency, safety, material flow, waste and salvage, quality control, portability, versatility and reduced downtime. Complete specifications of company's line of radial arm type woodworking equipment also is included.

For More Details Circle No. 147—Page 187

SELECTION GUIDE: Riehle Testing Machines Division, American Machine & Metals Inc., East Moline, Ill. —Bulletin RG-14-55 is an 8-page guide to the selection of testing machines and indicates a broad range of machines, instruments and accessories available from one source. Guide contains specific data and capacities of numerous testing machines—compression, plywood, cement briquette, impact, torsion, multiple wire and cable, horizontal tensile and universal. Units are illustrated with detailed photographs.

For More Details Circle No. 148—Page 187

CONSTRUCTION METHOD: Flowstrut Corp., 141 East 44th St., New York 13, N. Y.—Bulletin illustrates versatility of slotted angle bars of 14-gage steel which can be bolted together in an almost endless number of combinations to make anything from a workbench to a warehouse. Bars are predrilled 40 holes to the foot and reportedly no measuring, no drilling, welding or riveting are necessary. All materials are reusable should a structure be dismantled.

For More Details Circle No. 149—Page 187

ELECTRICAL CONDUCTORS: Philadelphia Tramrail Co., 3420 North Weikel St., Philadelphia 34, Pa.—Bulletin 7100 features design data for location of current conductors. Typical assemblies for various types of conductors along with components of the assemblies are illustrated.

For More Details Circle No. 150—Page 187

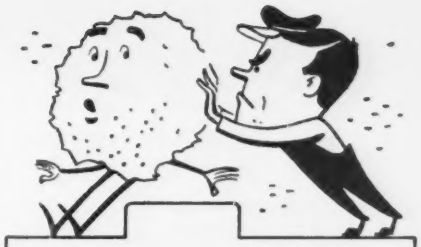
FURNACE CONTROL: Bristol Co., Waterbury 20, Conn.—Detailed specifications and engineering data for choosing pyrometers and control equipment for heat-treating, metal processing or other industrial heating applications are covered in bulletin P1260.

For More Details Circle No. 151—Page 187

PUMPS: Gray Co., Graco Square, Minneapolis 13, Minn.—Pumps, circulating systems and equipment designed for spraying or extruding liquids, semiliquids or semisolids used in production, construction or maintenance are covered in catalog 452.

For More Details Circle No. 152—Page 187

BASIC CUPOLA: Basic Refractories Inc., 845 Hanna Bldg., Cleveland 15, O. — Booklet, "Operating Practices with a Basic-Lined Cupola," reprinted from FOUNDRY discusses some inherent advantages of this foundry method and explains the mechanics of basic slag systems. Lining installation and maintenance pro-



The case of the hesitant sand...

Yes, a New England foundry really did have a case like this. As the sand started down through the overhead bins and hoppers, it paused uncertainly, sort of reared back and held up production something terrible.

Fortunately, the foundry superintendent called us for advice. In short order a battery of CLEVELAND vibrators were installed on the bins, and the sand hasn't hesitated ever since.

Whatever your hesitant material . . . cement, steel chips, ore . . . just tell us — or ask for our detailed literature.

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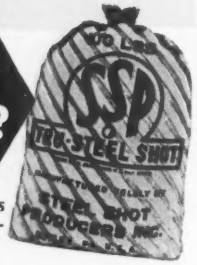
LASTS LONGER?



TRU-STEEL does because it is scientifically heat-treated, then drawn to precise tolerances. Thanks to its durability, *TRU-STEEL saves you money.*

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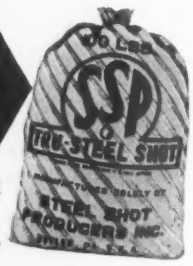

TRU-STEEL will not break into fines that cause wear of machine parts. Cutting down-time and parts replacement, *TRU-STEEL saves you money.*

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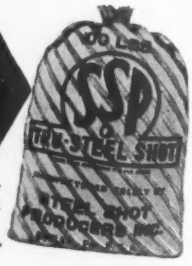

Controlled chemistry and careful control checks give TRU-STEEL the exact hardness for fast, thorough cleaning. Speeding production, *TRU-STEEL saves you money.*

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STEEL SHOT PRODUCERS, INC.
BUTLER, PA.
Subsidiary of Pittsburgh Crushed Steel Co., Pittsburgh, Pa.

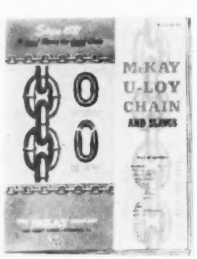
cedures are discussed as well as certain operating difficulties and their corrective measures.

For More Details Circle No. 153—Page 187

CONTROL DEVICES: General Electric Co., General Purpose Control Dept., Schenectady 5, N. Y.—General purpose control devices plus information correlating horsepower components for each type of motor control application is included in catalog GEC-1260A. Photos, book prices, wiring diagrams and dimensions on motor starters, contactors, relays, solenoids, switches, pushbuttons and pilot devices. Also included is information comparing applications and merits of manual and magnetic control, and across-the-line and reduced-voltage control.

For More Details Circle No. 154—Page 187

CHAINS AND SLINGS: McKay Co., 1005 Liberty Ave., Pittsburgh 22, Pa.—Bulletin AA gives details of the uses, properties and advantages of double-U welded chain made from high alloy steels in material diameters up to 2 in. One section presents technical reasons why the chain should be used under severe operating conditions where abrasion, rugged use and elevated temperatures up to 1000°F are factors in load handling. Another section details specifications on basic chain and contains data on selection of single, double, triple and quadruple branch slings. Reference charts indicate attachments to use and loads which can be lifted safely.



For More Details Circle No. 155—Page 187

COMPRESSOR: Pennsylvania Pump & Compressor Co., Easton, Pa.—Bulletin 602 describes a two-stage, heavy-duty, water-cooled, angle-type duplex compressor available in capacity ranges of 797 and 974 cfm piston displacement and 125 and 150 hp.

For More Details Circle No. 156—Page 187

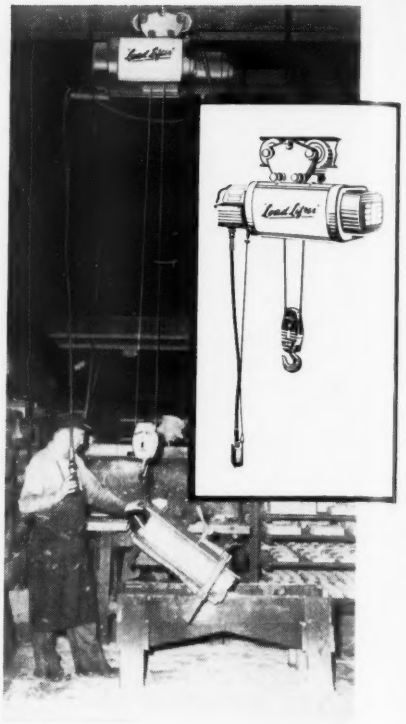
WELDING PROCESS: Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30, Pa.—Performance and applications of consumable electrode inert gas welding are given in booklet B-6525. Descriptions of fillet, lap, butt and plug welds made with the process are shown by actual photos.

For More Details Circle No. 157—Page 187

pH METER: Photovolt Corp., 95 Madison Ave., New York 16, N. Y.—Bulletin 105 describes large-size indicating meter which covers entire pH range from 0 to 14 without switching and without reversal of the pointer travel.

For More Details Circle No. 158—Page 187

AIR CLAMP CYLINDERS: Mead Specialties Co., 4114 North Knox Ave., Chicago 41, Ill.—Twenty-six



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SAVE MORE THAN ONE!

It takes careful, accurate handling to set cores, draw patterns and close flasks. That's why the two-speed Series "700" 'Load Lifter' Electric Hoist rates so high with foundrymen. Low speed is slow, creeping — no jerky starts! Lifting and lowering action is smooth, safe — only one-third as fast as high!

Two-speed push-button control starts slow or fast hoisting instantly — at the touch of a finger! Every load can be handled at the right speed at the right time. Spotting is easier, more precise. You save time, materials and avoid trouble.

If you want permanent savings, make the two-speed Series "700" 'Load Lifter' a part of your cost-cutting program. It's a heavy-duty hoist — always dependable, always efficient. Capacities: ½ ton up. Your "Shaw-Box" Distributor has details — or write us for Bulletin 410.

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ELECTRIC HOISTS

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Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

single-acting air cylinders in many variations of bore, stroke and mounting are included in company's line and covered in bulletin AC-8.

For More Details Circle No. 159—Page 187

FURNACE PRESSURE CONTROLLER: Minneapolis-Honeywell Regulator Co., Wayne & Windrim Aves., Philadelphia 44, Pa.—Bulletin 7404 describes the company's indicating pressure controller and its uses in measuring and controlling furnace operation.

For More Details Circle No. 160—Page 187

WIRE ROPE: Macwhyte Co., 2940 14th Ave., Kenosha, Wis.—Cable type overhead conveyor system, an automatic safety device for scaffold workers handling steel bar stock and other applications of wire rope are described in bulletin 554.

For More Details Circle No. 161—Page 187

STEEL SHELVING: Frick-Gallagher Mfg. Co., Wellston, O.—Boltless steel shelving that can be erected without use of tools is graphically described in catalog 701.

For More Details Circle No. 162—Page 187

ABRASIVE BELT MACHINES: Engelberg Huller Co., 831 West Fayette St., Syracuse 4, N. Y.— Catalog describes application methods of the company's line of abrasive belt machines.

For More Details Circle No. 163—Page 187

FOUNDRY reprints

Bearing Metals — Nickel-Alloyed Brass and Bronze by James S. Vanick presents information on foundry practice and applications of nickel-alloyed brass and bronze when used as bearing metals. Tables are included that present various compositions and properties for specific requirements.

For a Copy Circle No. 164—Page 187

How to Specify, Install and Care for Conveyor Belting by Robert H. Herrmann is a series of three articles presenting considerations for normal and high temperature conveyor belt requirements, speeds, hints on splicing and how to keep wear minimized as well as suggestions on preventive maintenance.

For a Copy Circle No. 165—Page 187

Simple System Provides Rapid Cupola Charging by Edwin Bremer is a detailed description of a semimechanical cupola charging system that is working satisfactorily in supplying metal for a wide variety of gray iron castings.

For a Copy Circle No. 166—Page 187

A Study of Investment Materials by H. O. McIntyre describes results of studies concerning materials and refractories commonly used in investment casting procedures.

For a Copy Circle No. 167—Page 187

Open the Door to SHELL MOLDING ECONOMY

with

SCHENECTADY

SHELL MOLD RESINS

These "Quick Exit Devices" by Sargent & Company of New Haven, Conn., are typical of the parts being shell molded with the use of Schenectady Resins.

These modern resins assure straight, rigid shells because of their *excellent hot rigidity characteristics.* They also produce stronger, more uniform shells because of their *superior tensile and transverse strength.* In addition, the *high pouring strength* of these Schenectady Shell Mold Resins permits casting to closer tolerances with no finning, and eliminates oversized and warped castings.

SCHENECTADY MEANS PERFORMANCE

There is a reason why the largest users of shell mold resins prefer Schenectady. Performance is that reason. Let us prove to you how Schenectady Resins can improve your shell molding operation. Let us show you how "performance" can help you open the door to greater shell molding economy. Mail the coupon today.

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Mixed Abrasive Wheels Aid Snagging Operation

Low Cost and Long Life Are Among the Benefits

By Norman P. Robie*

A PAIR of "good mixers" is helping take some of the snags out of snagging. The good mixers referred to are abrasives used in combination to get better performance and more mileage out of foundry grinding wheels. The idea of teaming for foundry use two abrasives—silicon carbide and fused alumina—which heretofore were always used separately, is comparatively new. It upsets some commonly held beliefs and practices.

Until now, simplified rules for selecting grinding wheel abrasives have overlooked the trend to using abrasives in combination. Consider these:

> "For steel, use fused alumina. For everything else, use silicon carbide.
>
> "For high-tensile materials, 50,000 psi and over, use fused alumina. For low-tensile materials, under 50,000 psi, use silicon carbide."

Exceptions to these rules now are notable.

For years, silicon carbide wheels were practically the only ones recommended for snagging cast iron, aluminum and brass. Today, more and more wheels containing mixtures of silicon carbide and fused alumina or all friable alumina are being used in high-speed, resin-bonded wheels for these materials. Generally, mixed abrasives are not used in vitrified bonded wheels because of the nature of the bond.

There are several reasons for this trend. Consider wheels for cast iron, for instance. Electro Refractories & Abrasives Corp., Buffalo, early pioneered in the use of mixtures of silicon carbide and fused alumina in wheels for snagging cast iron. Special bonds had to be developed to obtain a cutting action similar to that of 100 per cent silicon carbide wheels.

We found that wheels containing these abrasive mixtures gave lower grinding costs in many foundries. The combination of lower initial cost and greater life has been an important factor in promoting the use of these abrasive mixtures in foundry wheels.

Some foundries have been converted from vitrified bonded silicon carbide to resin bonded silicon carbide-fused alumina wheels with rather remarkable results. For example, one automotive plant was able to increase the number of brake drum housings ground per wheel on its floor stand grinders from 3600 to 5278. In another plant, using portable snagging wheels on cast iron motor blocks, it was possible to increase wheel life from 8 to 19 hours and at the same time to improve the cutting action.

Some foundries place more emphasis on a free, easy cutting action than on long wheel life. When fused alumina is added to replace part of the silicon carbide, the wheel becomes more durable. To maintain the same cutting action when fused alumina is added, the wheel grade and structure should be adjusted. In other words, either free cutting or very durable snagging wheels are possible, with mixed silicon carbide-fused alumina abrasives, through proper adjustment of grade and structure.

Properties of silicon carbide-fused alumina wheels are influenced greatly by the amount and type of alumina mixed with the silicon carbide. A number of alumina types are available for use in grinding wheels. Among other things, these types vary widely in the degree of friability they possess. Usefulness of abrasive grits is dependent upon their properties of hardness and friability.

Friability, or its opposite, toughness, controls the rate at which the abrasive grit breaks down and presents new cutting faces. It is breaking down of abrasive grits and the release of dulled grits by bond breakdown which prevents glazing of the wheel face. This property of friability or toughness has been measured rather simply by a test in which closely sized grit is ball milled with steel balls and the degree of breakdown measured by rescreening. The friability of the silicon carbide-fused alumina mixtures varies with the percentage of alumina in the mixture and with the friability of the alumina.

The possible wheel formulations for foundry work are manifold. Research and experience enables wheel manufacturers to specify wheels which will meet various requirements very accurately.

*Assistant Director of Research, Electro Refractories & Abrasives Corp., Buffalo

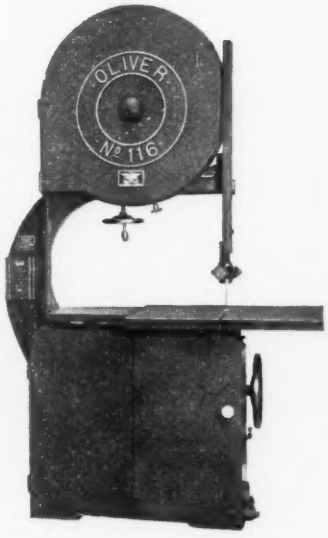
PLANT VISITATION: Twenty-five members of Michigan State College Chapter of the AFS visited Mid-West Foundry Co., Coldwater, Mich., on a recent trip. High spot of the trip was a tour of the precision investment department. Students are examining high alloy precision investment castings. Trip was arranged by John Wolf, plant manager, and R. S Bannister, manager, Precision Casting Division, Mid-West Foundry

Book Review

FBI Register of British Manufacturers, published for the Federation of British Industries by Kelly's Directories Ltd., and Iliffe and Sons Ltd., Dorset House, Stamford St., London, S.E. 1, England, cloth, 1089 pages, 7½ x 9½ in. Price 42 s.

Authorized directory of the Federation of British Industries contains eight sections that include a buyers' guide which classifies 6800 member firms under more than 5000 trade headings, and a comprehensive alphabetical directory of all these firms. Introductory information and detailed instructions on the use of the register are translated into French, German and Spanish. Other sections contain information about trade associations, proprietary names and trade marks.

Let this "OLIVER" 36-in. Band Saw speed up pattern work



Don't let size and variety of band saw work slow up your patternmakers. This "Oliver" handles a wide range of scroll work smoothly and rapidly. Takes 22" under the guide. Table tilts 45° to right, 7° to left, and is self-locking. Demountable ring-disk wheels—lightest, strongest, most rigid made. Lower wheel mounted on motor shaft in permanent alignment with base. Any type drive can be furnished. Most efficient braking system. Write for Bulletin No. 116-D.

"Oliver" Band Saws also made with 18", 30" and 38" wheels

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Many Advantages

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The incorporation of titanium into aluminum alloys may be accomplished more economically with Potassium Titanium Fluoride than with other methods.

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Where temperatures are in the range of 1400°F, the Potassium Titanium Fluoride may be added straight or, if lower operating temperatures are employed, a mixture of this salt with Potassium Fluoborate, which has a lower melting point than straight Potassium Titanium Fluoride, may be used.

And . . . Investigate B&A Alkali Fluoborates

B&A Alkali Fluoborates are easily-handled purifying salts which the foundryman can use like precision tools for a wide range of purposes when casting magnesium, or when refining, melting or heat-treating aluminum.

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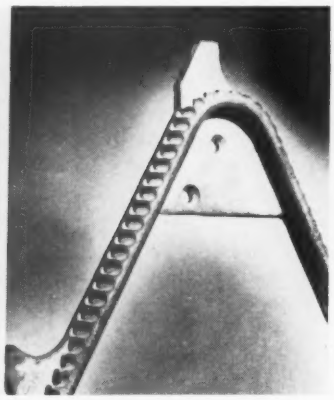
In Canada: The Nichols Chemical Company, Limited - Montreal* - Toronto* - Vancouver*
SETTING THE PACE IN CHEMICAL PURITY SINCE 1882
*Complete stocks carried here

The Shakeout

Shell Castings Require No Finishing

INTRICATE iron distributor tracks are cast with such precision in shell molds that they require no machining for use in complex bowling-pin spotting machines. Bonding fine-grained sand, Bakelite phenolic resins provide the necessary rigidity to thin, flat, triangular shell molds with sides nearly a yard long (left), at the same time



making them durable, accurate and pattern smooth.

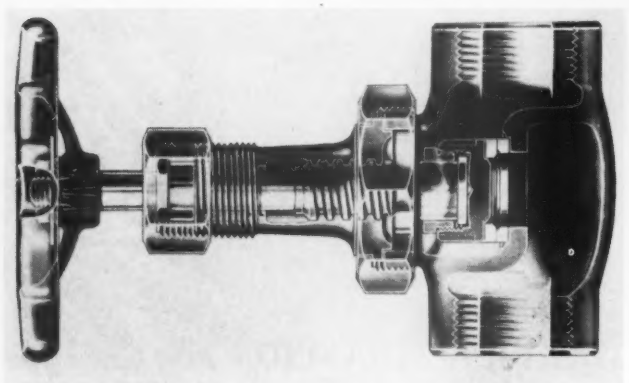
These shell molds are made by Builders Iron Foundry, Providence, R. I., to cast distributor tracks of Meehanite iron for the automatic pinspotter manufactured by American Machine & Foundry Co. Cast to tolerances of plus or minus 0.008-in., with the desired surface finish and casting flatness, the intricate parts are ready after cleaning (right).

In addition to eliminating finishing operations, the shell molds cut production costs by reducing scrap.

For More Details Circle No. 207—Page 187

Seating Metal Reduces Wear on Valves

A NEW type of bronze globe valve for throttling service has finished four years of tests on dozens of problem installations without failing or leaking. Two new elements are said to have made the performance record possible. The first is a new seating metal, patented under the name Brinalloy, which is hard all the way



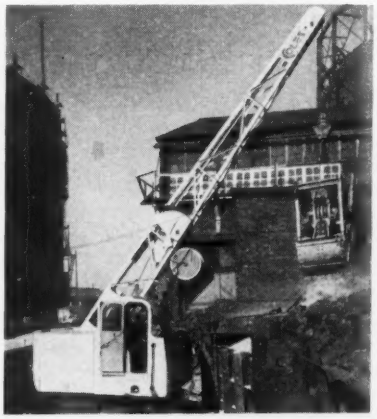
through, not just on the surface. The second is the flat-seat design of the valve.

Because of the seating metal's resistance to wear and corrosion, it can be fused permanently into the valve for its entire service life. Seats and disks do not require replacement, renewing or regrinding, according to Lunkenheimer Co., Cincinnati, producers of the unit.

For More Details Circle No. 208—Page 187

Crane Saves Demurrage Costs

UNLOADING a flat car of sand at a large Chicago foundry, this crane, a product of Coles Cranes, Joliet, Ill., saved paying demurrage costs because of its versatility in close quarters and its full 360-degree swing. The cantilever - type boom situated on an "A" frame reaches over and above piles. The foundry has relieved several men from yard operations for more important work in foundry since the crane rearranged the yard. The unit also is equipped for magnet operation to pick up and unload scrap.

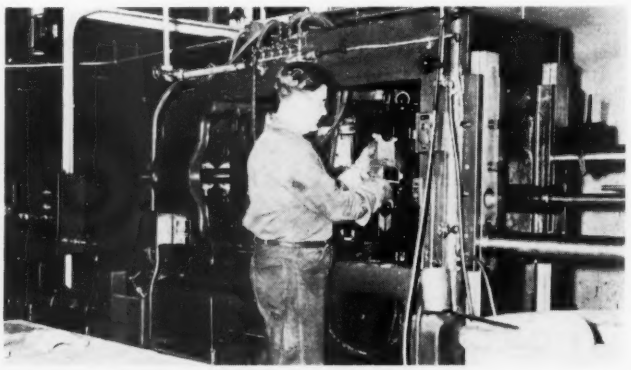


It is a rubber-tired, gas-electric machine with separate motors for hoist, boom hoist, slew and travel. A variable-speed, direct-current generator operates the motors, and the crane can be operated for 1 hr on 1 gal of gasoline.

For More Details Circle No. 209—Page 187

Die Cast Aluminum Sheaths on Magnets

ALUMINUM SHEATHS are cast on large magnets by this 400-ton die casting machine recently installed at the permanent magnet plant of Carboloy Dept., General



Electric Co., Edmore, Mich. The magnet "insert" shown weighs about ten times more than the amount of aluminum used.

No special methods are needed to hold the magnets on the two-piece die when the ¼-in.-thick aluminum casing is cast around them at 2000 psi. The "pull" of the premagnetized magnets holds them automatically against the die, which is shaped to their contour. Finished work is ejected from the machine by a pressure of 3000 psi. Magnets are encased in aluminum for insulation and to simplify installation.

For More Details Circle No. 210—Page 187

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because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

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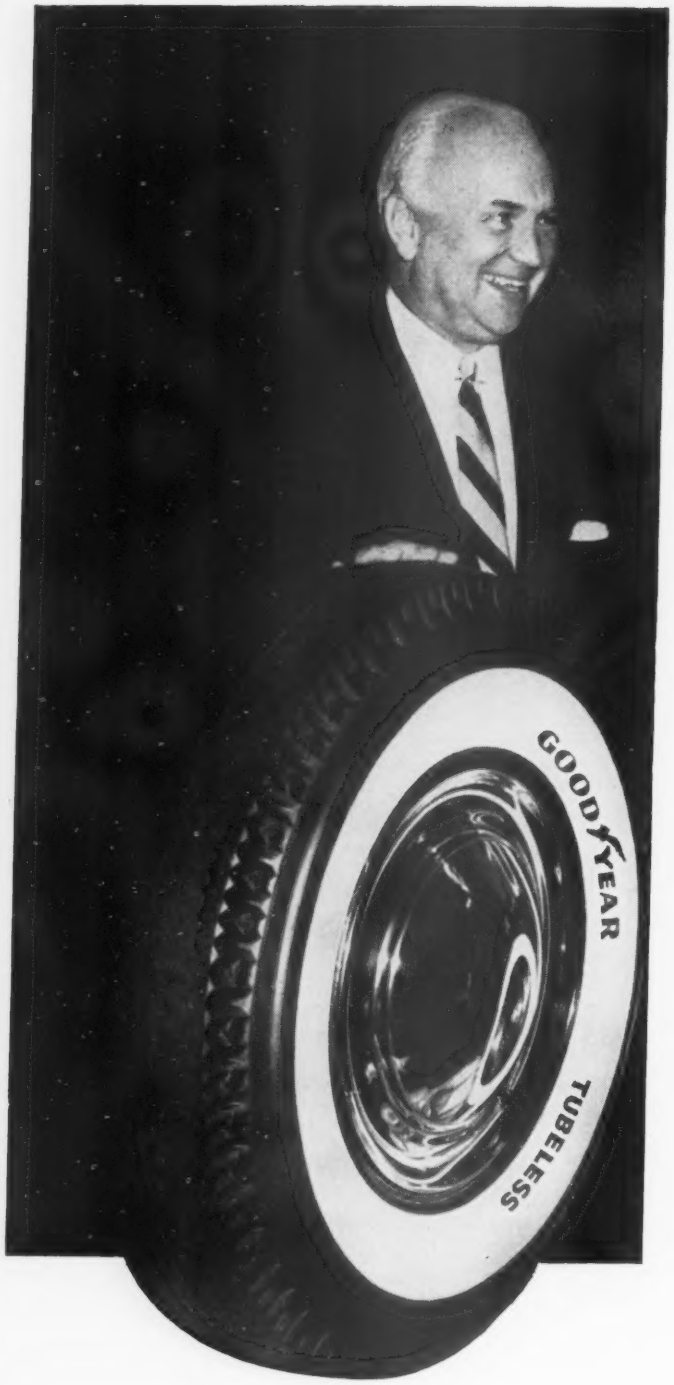

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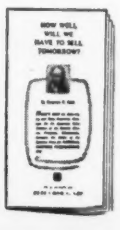

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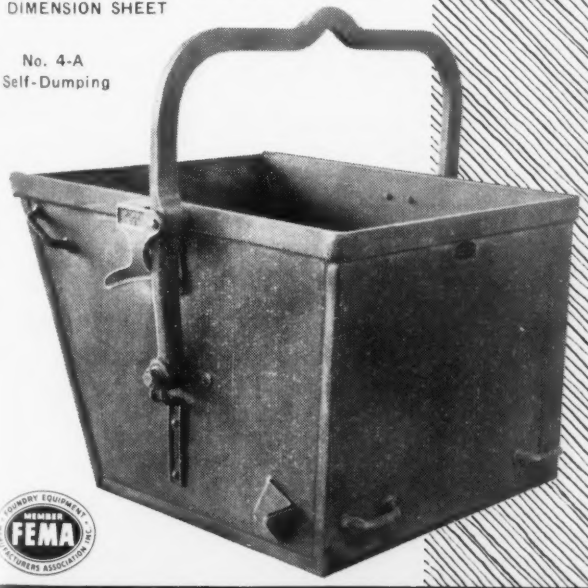

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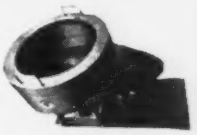
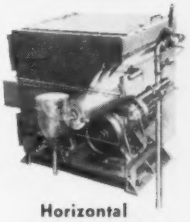
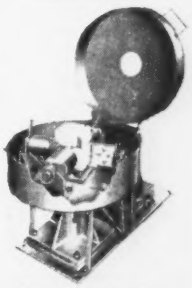


Vertical Water-Cooled



Horizontal Water-Cooled



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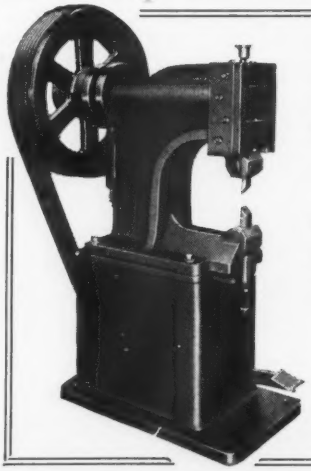

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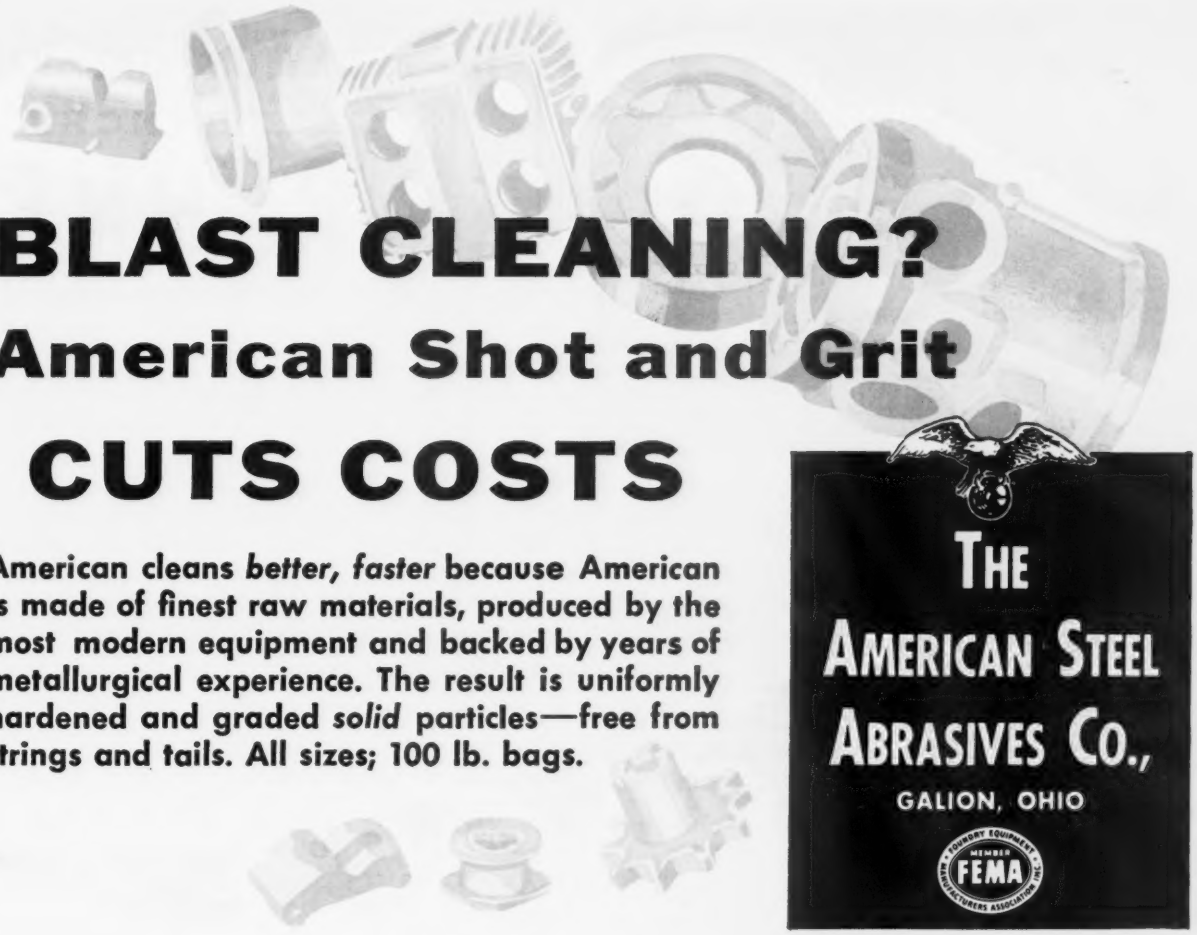

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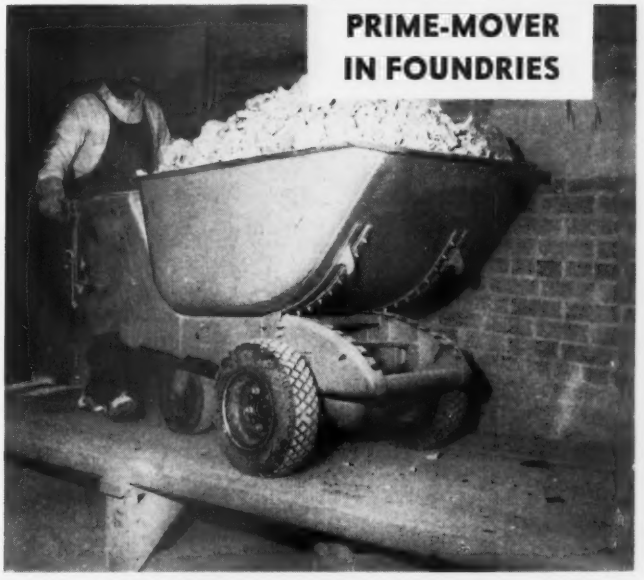

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PRIME-MOVER (with bucket as shown) also delivers the charge for the cupola, hauls castings, sand or scrap. The same PRIME-MOVER (with interchangeable flatbed) also delivers patterns and molds anywhere in the plant or yard.

PRIME-MOVER fits standard elevators, goes through narrow doorways and aisles, and is completely protected against foundry grit by sealed-in lubrication throughout the entire all-gear drive.

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PRIME-MOVER

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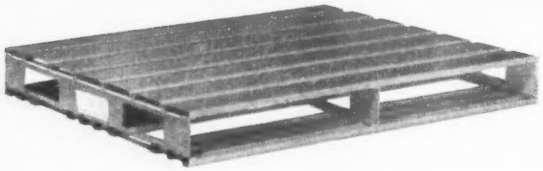
with *Brusco* HANDLING EQUIPMENT

No. 930 BRUSCO PALLET



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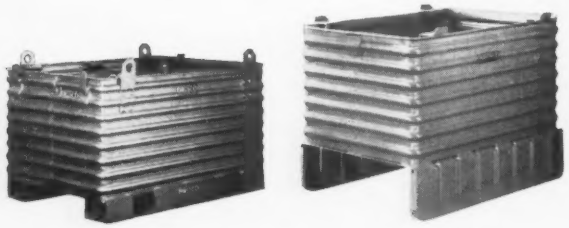

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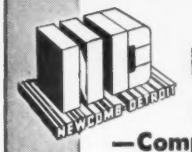

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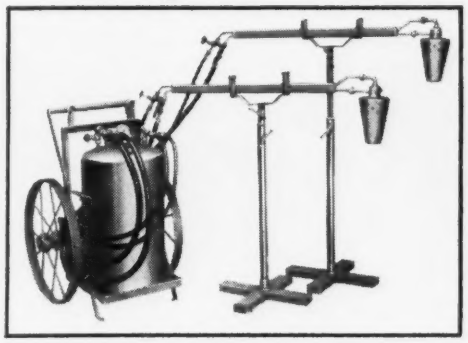

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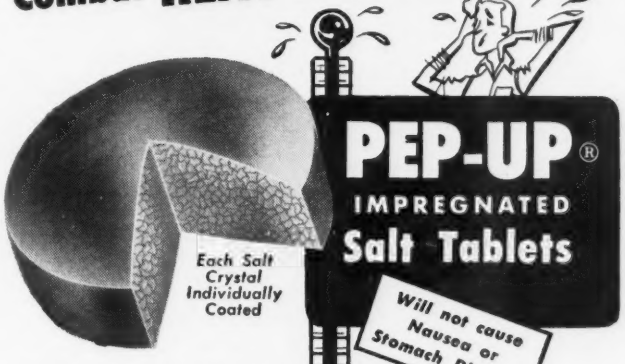

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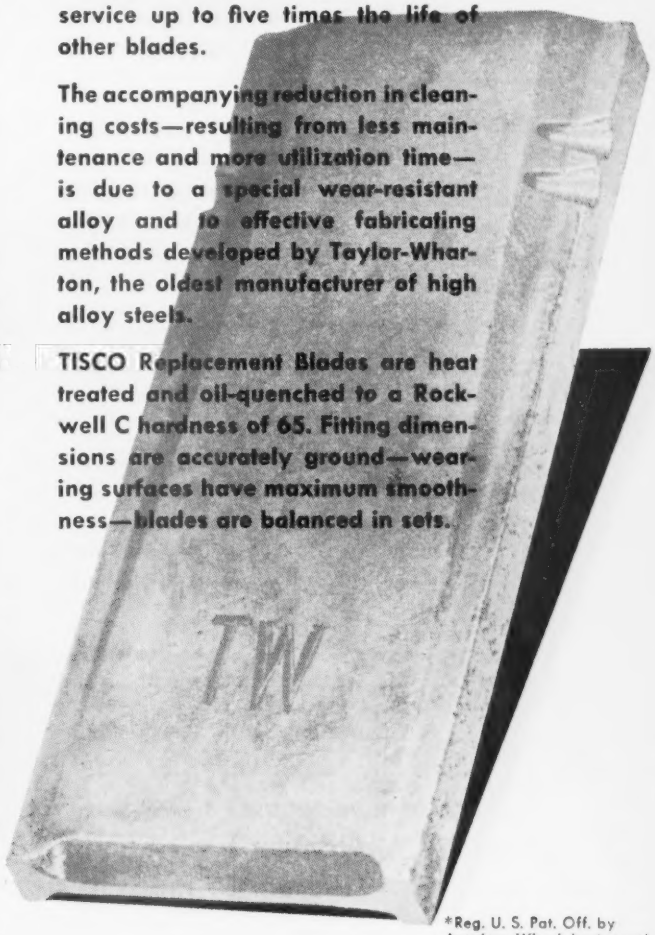

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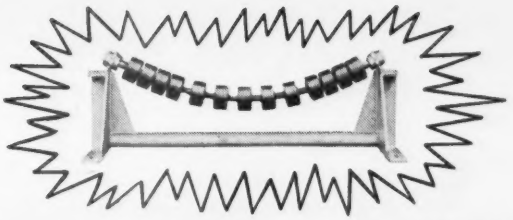

Where There's **ABRASION** *or* **CORROSION**

. . . This JOY IDLER OUTLASTS THEM ALL!

SHAPES TO THE LOAD . . . CUSHIONS, GUIDES BELT

The unique Joy *Limberoller* Conveyor Idler consists of neoprene discs molded on flexible steel cable. It's suspended from two bearings—one at either end, *up out of the dirt zone.* Illustrated is an installation in a dusty coke plant. In another typical job, handling abrasive foundry sand, Joy units have lasted *10 times longer* than any previous idlers and are still going strong.

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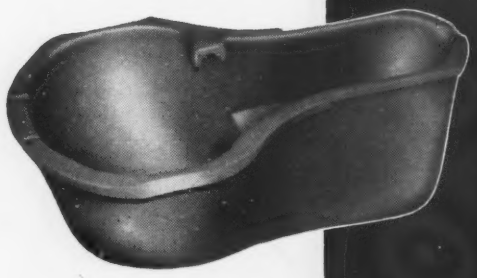

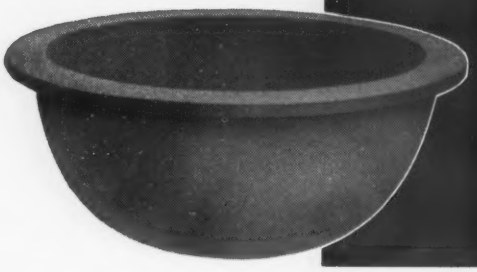

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Help Wanted

SHELL MOLD SUPERVISOR

Must have considerable practical experience in all phases of shell molding as an operator and a supervisor. Will accept man with working experience in place of technical background. To head new department. Excellent starting salary, good advancement potentials. Give age, salary requirement, complete resume of experience and past employment. All replies confidential.

BOX 580, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MOLDING FOREMAN

Steel foundry experience, located Chicago area. Jobbing shop. Must know floor molding, heading, gating and piece work set ups. Address: Box 583, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

HELP WANTED

Exceptional opportunity for graduate mechanical engineers with gray iron shop experience, between 26 and 35 years of age. Give all particulars. Address: Box 585, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

SALES ENGINEER

Aggressive and successful AAA1 New York Company is making available for first time to industry nonferrous investment castings produced by unique company-created process. Lucrative opportunity exists for sales engineer with heavy technical sales experience in this field. Detailed resumes are requested and will be held in confidence.

BOX 551, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ELECTRICAL MAINTENANCE FOREMAN

Age 25-35. B.S.E.E. degree desirable. Familiar with steel foundry or steel mill problems and practices. Desired for permanent position in a leading Eastern steel foundry. This is not just another job. If you have ability and can think, opportunity exists. Send resume and salary expected.

BOX 546, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERINTENDENT

For medium-sized nonferrous jobbing foundry near Detroit, Michigan. Must be thoroughly experienced in molding, gating, coremaking and melting procedures. Please send complete data and salary expectations with first letter. Replies confidential. Address: Box 582, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Superintendent-Engineer for nonferrous shell mold foundry (little gray iron). Experienced in all phases. Address: Box 570, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

MELTING FOREMAN

Experienced melter, acid steel carbon and low alloy grades. For a progressive well established organization in Eastern Pennsylvania. Splendid opportunity.

BOX 567, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PROJECT ENGINEER

Specialized gray iron foundry Mid-Ohio City of about 80,000 population. Various non-repetitive production problems including research and development under supervision of Vice-President. Recent graduate foundry option Industrial Engineer with some shop experience. Replies confidential. Write full details personal background, resume of experience, references and salary expected. Address: Box 499, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Experienced in cast iron and foundry practice. Prepared to travel. State salary required and full qualifications. Address: Box 511, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Help Wanted

WANTED
MANUFACTURING MANAGER
OR
GENERAL SUPERINTENDENT

To direct manufacture of Iron and Steel Quality Castings
Well-established, progressive foundry
Employing 600-700 Workers

Best equipped, most modern job shop in United States
Ideal location in California

UNUSUAL OPPORTUNITY
Furnish education, experience, age, and references
BOX 530, FOUNDRY, PENTON BUILDING, CLEVELAND, OHIO

HELP WANTED
IF YOU HAVE A THOROUGH KNOWLEDGE OF RIGGING CORE BOXES FOR CORE BLOWING AND LIKE TO TRAVEL, YOU MAY QUALIFY AS FIELD SERVICE REPRESENTATIVE FOR A LARGE FOUNDRY EQUIPMENT MANUFACTURER. SOME ENGINEERING EXPERIENCE WOULD BE DESIRABLE. APPLY IN WRITING, STATING QUALIFICATIONS.
BOX 560, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

PRODUCTION FOREMAN

Large malleable foundry has opening for production foreman thoroughly familiar with molding, gating and risering of malleable iron. Send resume including salary desired.

BOX 554, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

EXPERIENCED PLANT MANAGER

For small progressive alloy steel foundry in Michigan. Technical background preferred but not necessary. Splendid connection for right man.

BOX 587, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SUPERINTENDENT

Steel process foundry. Salary open. Address: WALKER EMPLOYMENT SERVICE, 537 N.W. BANK BLDG., MINNEAPOLIS 2, MINNESOTA.

Positions Wanted

GENERAL MANAGER OR ADMINISTRATIVE ASSISTANT

Experienced nonferrous general manager available for administrator or assistant. Operated nonferrous foundry, machine shop, pattern shop, heat treat. Technical work in iron and steel. Doing general industrial consulting. Good sales, operating, labor negotiation record. Age 47. Engineer. Native midwest. Willing to relocate. Address: Box 547, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MATURE BUSINESS MANAGER

Invites opportunity to stabilize going business and train logical future manager. Successfully managed five companies—three taken out of the red. Trained two successors, both made good. Qualified to handle complete administrative responsibility and develop all profitable possibilities. Excellent experience foundry, machine and related lines. Address: Box 581, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

COREROOM FOREMAN

New Jersey area. Thirty-one years experience in all phases of coremaking including sand mixing, drying, assembling, jolt roll-over machine, coreblowers; can handle large group of workers, male and female. Trouble shooter on cored castings and also production minded, age 46. Address: Box 562, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMAN OR SUPERINTENDENT

Thirty-three years' practical experience, 20 years as supervisor in both jobbing and high production shops. Experienced in rigging and gating for fast production and quality castings, both gray iron and nonferrous metals. Addess: Box 588, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

FOUNDRY MANAGER

Gray iron or ductile iron foundry manager or sales manager available. Will improve the quality of castings and increase sales. Prefer Milwaukee area. Experienced all phases of foundry operations. Address: Box 561, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

DESIRE CHALLENGING POSITION

Three and a half years gray iron foundry experience. Acquainted with all phases of foundry operation. B.S. degree in Economics; 28 years of age; married. Presently employed as general foundry foreman. Looking for a greater opportunity. Will send complete resume on request. Address: Box 564, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thorough knowledge of all phases of nonferrous metals. Understand gating, jobbing, floor, machine and plumbers supplies. Can also produce pressure tight and porous free castings. Know sand control and core room work. Address: Box 569, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST-SUPERVISOR

Six years' experience in foundry industry in production, research and customer technical service with aluminum, magnesium and bronze. Desire position in production or as service engineer. Midwest preferred. Address: Box 566, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

EXECUTIVE OR MANAGER

Seeking position; fully qualified to perform and direct all executive and administrative functions of foundries and entire manufacturing plant. Working knowledge of all metals. Many years of experience. Excellent references. Address: Box 575, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ENGINEER

Degree Metallurgy, 22 years' experience in all phases; metallurgy, production, surveys and layouts, management. Eight years' consulting experience. Seeking position at management level. Age 43, will travel or relocate. Address: Box 586, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT

Gray iron, magnesium, aluminum, 20 years' practical experience. Experienced in all phases melting, molding, gating, sand control. Well versed in rigging new patterns in core making, core mixes and general design and handling core boxes. Both large and small jobs. Address: Box 590, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE AND METALLURGICAL ENGINEER

Presently managing gray iron foundry seeking new affiliation with progressive gray iron or malleable foundry or sales organization. Experience in management, technical, sales and operational phases of gray iron and malleable. Age 34. Address: Box 568, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

SUPERINTENDENT OR GENERAL FOREMAN

Desire position with medium-sized jobbing or production shop. Gray iron or nonferrous. Practical man with thirty years' experience. Well versed in every department. Western or Central New York preferred, but not essential. Address: Box 574, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SAND TECHNICIAN

Control, research and development. Excellent general foundry background. Top quality gray or malleable iron shop preferred. Age 46. Address: Box 592, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Practical superintendent with technical training in modern methods, ferrous, nonferrous, aluminum, magnesium, seeking connection where experience past thirty years can be fully utilized. Capable setting up new plant, modernize to produce quality casting on production basis, low scrap. Installed, operated fully mechanized system, semi-mechanized, all types molding machines. Resume of successful operations, business and character references. Eastern States. Address: Box 591, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPPLY OR EQUIPMENT SALESMAN

Man with 33 years' practical foundry exeperience, 15 years as superintendent. Desire change, would like to try selling foundry supplies or equipment. Address: Box 589, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN

Twenty-nine years' foundry experience, past sixteen in supervisory capacity. Can handle coreroom and molding floor. Cost conscious, good labor relations, high production caliber. Will relocate anywhere. Address: Box 573, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Thoroughly experienced in the management of gray iron production or jobbing foundries. Qualified to show you a highly efficient and low cost operation. If you are interested, Address: Box 556, FOUNDRY, Penton Bldg., Cleveland 13.

Representatives Wanted

REPRESENTATIVES WANTED

MIDDLE EASTERN MANUFACTURER IS EXPANDING SALES EFFORTS INTO ALL FOUNDRY CENTERS OF U. S. AND CANADA. CHOICE TERRITORIES NOW AVAILABLE FOR SELLING THE ONLY MACHINE PRESENTLY AVAILABLE ON TODAY'S FOUNDRY MARKET FOR BLOWING PERFECT CONTOUR SHELLS AND CORES IN THE "C" PROCESS. ADVISE PREVIOUS EXPERIENCE, QUALIFICATIONS, ETC. ALL CONFIDENCES RESPECTED.
BOX 579, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Agents now calling on foundries to sell patented lighting fixture designed for foundries. Exclusive. Attractive commission arrangement. No inventory. Excellent repeat business.
MIDWEST LIGHTING PRODUCTS CO.
P. O. BOX 536
CLEVELAND 7, OHIO

OHIO TERRITORY

Open for distribution of product used in gray iron and malleable iron foundries. Aggressive sales effort will yield attractive profit. Warehouse facilities necessary. Producer will assist in expanding established market. Address: Box 565, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

SALES REPRESENTATIVE

For a well established nonferrous alloy company. We make such alloys as Copper Shot, 50/50 Copper Nickel Shot, Manganese Copper, Aluminum Bronze Hardeners, Manganese Bronze Hardeners, Deoxidizers and Degasifiers, 5% Titanium Aluminum, Silicon Aluminum, Manganese Aluminum and many similar alloys. We have excellent territories open with active accounts. Our plant is located in the Buffalo, New York area. Address: Box 584, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALS, MINERALS, CHEMICALS

Salesman with industrial clientele, wanted on high commission. Write complete personal and sales data in confidence. Include photo. BRAM CHEMICAL CO., 829-65th AVE., PHILADELPHIA 26, PENNSYLVANIA.

WANTED

Manufacturers' Agent for aluminum production foundry located in Northern Ohio. Liberal commission. Address: Box 522, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Opportunity

OPPORTUNITY

Detailed set of plans for shell molding machine available. Excellent production capacity, capable of being produced at moderate figure. Technical molding consideration stressed in design. Designed by responsible graduate engineer with extensive experience in experimental and production shell molding work. Any reasonable business arrangement considered. Address: Box 577, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

One electric arc steel making furnace 1-2 tons nominal capacity with or without transformer and auxiliary equipment.

Also steel making induction furnace with nominal capacity of 100-300 lbs.

Specify condition, age and price.

Address replies to:

VANADIUM CORPORATION OF AMERICA
BRIDGE STATION
NIAGARA FALLS, NEW YORK
ATTENTION: MR. R. A. DAVIDSON,
CHIEF ENGINEER

WANTED

OSBORN ROTO-LIFT
MOLDING MACHINE
MODEL NO. 3161

PEORIA MALLEABLE
CASTINGS CO.
PEORIA, ILLINOIS
PHONE 2-5401

WANTED TO BUY

Will buy outright an investment casting company with or without present management. Reply directly or through your attorney or accountant.

BOX 552, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

MACHINERY WANTED

Induction Furnaces, Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: CONDENSER SERVICE & ENGINEERING CO., INC., HOBOKEN, NEW JERSEY, BA 7-0600.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS

National Placement and Procurement of

GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS.

Confidential Inquiries Invited
From Employers and Qualified Applicants.
For Fast Competent Assistance Contact

DRAKE PERSONNEL, INC. **FINANCIAL 6-2100**
JOHN COPE, DIRECTOR **7 WEST MADISON ST., CHICAGO, ILL.**

Wanted-To-Buy

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED

Number 2 bucket loader for Clearfield 610 sand mixer. Electrically operated, 230 volt A.C. Address: GLASSMERE CASTINGS COMPANY, GLASSMERE, PENNSYLVANIA.

Foundries For Sale

FOR SALE, LEASE OR PART INTEREST

Nonferrous shell mold foundry in Midwest. 15,000 sq. ft. with buildings for expansion. Proprietary deep draw shell mold machinery. Address: Box 571, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRIES FOR SALE

Established going gray iron foundry in Central Wisconsin. Fully equipped; manufacturing own line and general jobbing. Capacity up to ten tons per day. Over $70,000 value. Can be purchased for less than half. Principals only. Address: Box 531, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SMALL FOUNDRY FOR SALE

Well-equipped foundry in Eastern Pennsylvania. Has overhead crane, cleaning equipment. Plenty of adjacent land. On railroad. Address: Box 572, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

ATTENTION CANADIAN BUYERS

We have just purchased another lot of 48 x 42 wheelabrators some of which are in Canada. These can be purchased Duty Free. Some are in excellent condition and can be seen in operation. Priced to sell from 950.00 to 2500.00.

BUY—SELL—TRADE

15" Continuous Wheelabrator	$4,500.00
27 x 36 Wheelabrator (Rubber Belt)	2,650.00
27 x 36 Wheelabrator (Iron Belt)	2,500.00
#2 Wheelabrator Table 8' Diameter with 8 Auxiliary tables 28" diameter	3,500.00
Pangborn 6' Rotoblast table 8 Auxiliary Tables	3,500.00
Pangborn 6' Rotoblast Table with Flat Single Table	3,000.00
Pangborn ES-421 Shell Blasting machine (Like New)	3,500.00
Vapor Blast Machine	800.00
Hand blasting cabinets (Like New)	
Dust Collectors all sizes 300 C.F.M. to 14,000 C.F.M.	

ALSO

Pressure tanks, elevators, blowers, motors all types and sizes.

DIAMOND SAND BLAST INC.
5654 W. JEFFERSON AVE.
DETROIT 9, MICHIGAN
PHONE VINEWOOD 3-6750

FOR SALE

Heavy Duty Craneway 20 Pcs. 14" x 14" heavy section columns 29'6" long. 20 Pcs. 20" x 12" heavy section beams 20'-0" long all knee braced. Will make 180' long craneway with 2 extra beams. Craneway bolted construction and has been protected by paint. Contact: C. L. MECHLING, PURCHASING AGENT, DODGE MANUFACTURING CORP., MISHAWAKA, INDIANA.

For Sale

FOR SALE

American Wheelabrator Tumblast, 48" x 48" complete with loader, dust collector	$6000.00
American Wheelabrator Tumblast, 36" x 42" with dust collector	32.50.00
25—Osborn 2047-4 jolt rollover, molding machines 18" x 24" tables, 8½ draw	300.00
23—Tabor 10" squeeze	100.00
Tabor 30" x 40" HYD jolt rollover	1200.00
SPO 110PJ jolt squeeze	225.00
SPO 113PJ jolt squeeze	300.00
Berkshire jolt squeeze	225.00
Osborn 712PJ jolt stripper, 18" x 28" table, 6" draw, 12" cylinder	750.00
Milwaukee jolt stripper, 32" x 38" table, 10" draw, 16" cylinder	1250.00
Simplicity shakeout, 6' x 8'	600.00
Flotex 4' x 6' shakeout	900.00
B & P #40 muller	1000.00
Simpson #0 muller	600.00
B & P Screenarator	275.00
B & P Screenarator, 5 HP motor	600.00
3—Royer portable sanditioners, large size	150.00
Demmler #2 core blower	450.00
Hardness tester, Gogan Electric, 4500 KG, Brinell	500.00
Gehnrich core oven, 5' x 4' x 5'	300.00
Gehnrich core oven, 10' x 9' x 10'	750.00
3—27" x 36" American Loaders	300.00
Spencer Turbo Blower, 16 oz. 800 CFM, 5 HP motor	300.00
Rotoclone dust collector, sludge type, 2500 CFM, 5 HP motor and blower	750.00
American Dustube #185, 16550 CFM with 25 HP motor and blower	1750.00
Pangborn sand blasting tanks, rooms, abrasive separators, elevators, dust collectors.	

M. ELSTEIN
422-426 GRAND STREET
JERSEY CITY 3, NEW JERSEY
TELEPHONE HE-5-7571

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
6000	32oz.	Ing.-Rand	500	10oz.	No. Am.
4700	32oz.	Ing.-Rand	380	16oz.	No. Am.
4050	16oz.	No. Am.	340	20oz.	A-B
2700	16oz.	Spencer	320	12oz.	Spencer
2500	7oz.	Sturt.	140	32oz.	Hoffman
2000	16oz.	Spencer	9000	6"SP	Northern
1150	20oz.	No. Am.	3420	8"SP	N.Y.
800	13oz.	Buffalo	2500	½"SP	American
525	48oz.	Ing.-Rand	2344	2"SP	Clarage
			1100	4½"SP	Bayley

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

1—Tinius Olsen 100,000# Universal Compression Testing Machine
1—Magnaflux Demagnetizing Unit
Simpson Sand Mixers 18" dia. Laboratory #0, #1, #1½, #2, #3.
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.

OUR 38th YEAR

CONSOLIDATED PRODUCTS CO., INC.
66 BLOOMFIELD STREET
HOBOKEN, NEW JERSEY
HO 3-4425 **N.Y. TEL. BA 7-0600**

America's Largest Stock of Electric Melting Furnaces!

1—1500 KVA G. E. Transformer with taps for 11,000 or 13,800 volts.

Lectromelt 1 ton Side Charge with 800 KVA, 12,000 V transformer. Late type unit. Complete. Now in our Chicago warehouse.

1—Whiting Hydro Arc 8 MT Top Charge, 5600# per hour rate of melt, 8900# capacity of well, 8" electrodes. Furnace new 1952. 2000 KVA transformer, 12,000 volts. Complete with American Air Filter, smoke hood and Whiting Bag Type Dust and Smoke Suppressor. May be seen in place Chicago.

1—Chicago 3000# Electric Furnace, tilt back head. 4" electrodes, 800 KVA, 12,000 V transformer. Complete. May be seen in place Chicago.

1—Swindell Type 6 ton 9' diameter Shell Electric Furnace, 2500 KVA transformer, 13,800 or 11,000 V. In our Chicago warehouse.

Lectromelt 500# Side Charge Type T, 300-375 KVA transformer, 2300 V primary, Moore controls, G. E. circuit breaker. Late type. Now in our Chicago warehouse.

Transformers—2—2500 KVA furnace transformers, 11,000 or 13,800 primary voltage.

1—Detroit Electric, 1500# capacity, 13,200 primary voltage. Kuhlman transformers. Complete with controls.

Detroit Electric 350#, Type LFA with Kuhlman transformers and oil circuit breaker, 13,200 primary voltage.

Detroit Electric with 350# and 1000# tapered shells, 2300 V Kuhlman Transformer. Complete with panelboard and bus bars.

Herrault 2000# Side Charge, complete with Pennsylvania 1500 KVA transformer, 12,000 volt primary and 150-90 volt secondary. New control panel; new Field Rheostat, new motor generator set-ball bearing, 25 HP 3/60/440 V/1800 rpm, 250 V compound wound. With 51 nipples and sufficient roof brick for almost six roofs.

ACME EQUIPMENT CO., INC.

126 South Clinton Street, Chicago 6, Illinois
Phone: ANdover 3-3430

CUPOLA

Morris Steel Products Company Cupola, 90" I.D. shell, 40' from bottom of crucible to top of stack, equipped with vertical skip hoist charging unit, with 3000# charging bucket, electric hoist and magnetic brake, mixing ladle 5' length x 4' dia. Complete with Ingersoll-Rand type FS-564-13000 CFM, driven by 150 HP 440 V, 3 Ph., 60 Cy. motor. THIS CUPOLA WAS NEVER USED, NEVER HAVING BEEN ERECTED. ORIGINALLY BUILT IN 1948.

INDUSTRIAL SUPPLIES COMPANY
324 NORTH SEVENTH STREET
STEUBENVILLE, OHIO

FOR SALE

American Wheelabrator, swing table 86" diameter, complete with motors and control panel. Practically new.

PYOTT FOUNDRY AND MACHINE COMPANY
328 NORTH SANGAMON STREET
CHICAGO 7, ILLINOIS

FOR SALE

CUPOLA FURNACE—48" Dia. x 30" high—2 ton capacity, good condition, recently relined, complete with #6 Sturtevant blower, 20 HP motor and V-belt drive, extra firebrick.

DOVER CHEMICAL CORPORATION
DOVER, OHIO
PHONE: 64622

FOR SALE

1—Model M, type 99/80 American sand cutter with new repair parts.

BRILLION IRON WORKS, INC.
BRILLION, WISCONSIN

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.

FOR SALE

1—Sprue Cutter (¾" brass capacity)
1—Whiting Hydro Blast (complete with pump and all electrical equipment)
1—American Wheelabrator Model 15 x 20 complete with dust collector
2—Demmler #1 Core Blowers
1—Paddle type core sand mixer

GLAUBER WATERWORKS COMPANY
4520 SOUTH 36th STREET
OMAHA 7, NEBRASKA

STEEL MELTING FURNACES

One 350 lb. cold charge. Never used. One 60 lb cold charge. Slightly used. One 17 lb. Model PT. Slightly used. All furnaces Detroit Rocker Indirect Arc with spare shells. Complete with meter panels, switches, and transformers. All wired for 220-volt 60-cycle. Will sell or trade for M. G. Induction unit.

FALLON INDUSTRIES
25800 GROESBECK HIGHWAY
ROSEVILLE, MICHIGAN
PH: PRESCOTT 7-2500

FOR SALE

#2 PANGBORN TYPE "GF" BARREL BLAST CLEANING MACHINE. Complete with direct motor drive barrel and dust collector and all electricals and extra barrel.

M. COOPER
2153 WEST FULLERTON AVE.
CHICAGO, ILLINOIS

FOR SALE

OSBORN, size 563-9 Jolt Stripper Molding Machine, table 55 x 63, 7000# capacity.

$500.00

P. O. BOX 711
NEW CASTLE, PA.

FOR SALE

ROBINS Model 72-96 (6' x 8'), style JF-11 Standard Floatex Shakeout. 17 ton capacity. With wet type Roto-Clone Dynamic Precipitator. Address: Box 563, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOR SALE

MOLD CONVEYOR—Link-Belt Horizontal Plane "Car Type", 152'-3" centers terminating by 4'-6" radius bends at each end with automatic Link-Belt #PD 156 Vibrating Shake Out Screen, G. E. 5 HP Motor, 1800 RPM Type "K," Frame #254, TEFC enclosure, 440 V, 3 ph., 60 cy.

BLAST CLEANING BARREL—Pangborn #14 Type GK-2, converted to GK-5. Equipped with #14 Type "FN" Vertical Tilting Loader and #12 Style "C" abrasive reclaimer.

INDUSTRIAL SUPPLIES CO.
330 NORTH SEVENTH ST.
STEUBENVILLE, OHIO

FOR SALE

CORE BLOWER, Federal San-Blo, Pulsator Model 40-P-1 Serial No. 253-319. Complete with Pre-fill Timer. 110v/60 cy. Never used in production.

THE TRUMBULL BRONZE COMPANY
WARREN, OHIO

MOTORS — GENERATORS
TRANSFORMERS

Unused — Rebuilt
WORLD'S LARGEST INVENTORY

ELECTRIC EQUIPMENT COMPANY
Phone Station Collect GLenwood 6783
P. O. Box 51 — Rochester 1, New York

FOR SALE

Electric Crane Overhead, 34' span, 8 ton capacity	$1500.00
Connersville Blower for 48" Cupola	500.00
Sand Blast Room, 12' x 22'	250.00
72" Cupola	400.00
Osborn #375J Jolt Squeezer	125.00
48" Table 10 ton Herman Rollover	900.00

And other foundry equipment reasonable for sale.

BOX 576, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

For Sale

FOR SALE

MOLDING MACHINES

1—Herman, Jolt, Rollover Draw, 6000#, 40" x 60" table.

1—Herman, Jolt Stripper, 48" x 54" table.

2—International, Jolt, Rollover Draw, 24" x 10G, Stationary.

2—International, Jolt, Rollover Draw, 20" x 8-G, Portable.

1—SPO #305 Jolt Stripper.

2—No. 275 Osborn jolt squeezers.

2—SPO #611B stationary oscillating, jolt, squeeze strippers.

CORE OVENS

1—Coleman Recirculating 3 section with 5 drawers per section. Gas fired.

1—Coleman Recirculating 4 section with 5 drawers per section. Gas fired.

BLOWERS FOR CUPOLAS AND FURNACES

1—Connersville Rotary Blower, 3500 CFM.

2—#7½ Roots rotary blowers—27 x 81—14000 CFM.

2—Connersville Rotary 14" x 27" HD, 2750 CFM at 5# press.

1—Connersville rotary blower 22 x 66 45 cu ft. per revolution 9000 CFM.

Maxon-Premix Blowers for Gas ¼ to 1 HP.

2—5 HP 20-oz. Spencer Turbine Blowers.

2—2 HP 20-oz. Spencer Turbine Blowers.

METAL MELTING EQUIPMENT

1—1000# open flame brass melting furnace, gas fired.

1—Hausfeld Stationary Brass, oil or gas burner, 200# cap.

1—Hausfeld Tilting crucible, gas, 250# Al, Cap.

1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.

MISCELLANEOUS

1—Pangborn 1 to 4 nozzle air blast generator, complete.

1—Sullivan, 2 stage compressor, 14-8¾ x 10, 75 HP.

1—20 HP U. S. Four Speed Snagging Grinder, 24" x 3" wheels.

1—Sly Tumbler 24" x 40".

1—International SB-11 core blower.

2—Pangborn cloth screen collectors, 2 HP.

1—Stoney crane type shakeout.

1—NC-4 Royer sand separator.

1—#1 Demmler core blower.

1—#16 Roto-clone unit complete.

Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY

1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

CORE BLOWERS

Osborns, Model 91, 193, and 94

Redford—Bench type

GRINDERS

U. S. 7½ HP 3 speed 28" wheel

Marschke 10 HP, Swing Frame

MOLDING MACHINES—JOLT, SQUEEZE, STRIP

Osborn, 724 & 726 PJ, 4000 lb.

Milwaukee, 143, 163, and 183, 1500 lb.

Nicholls, Type D, 1500 lb.

MOLDING MACHINES—JOLT, SQUEEZE

Osborn, #275

Spo, Model 110 J

Nicholls, Type B

MOLDING MACHINES—JOLT, ROLLOVER

International—Type G Size 30 x 12

International—Type F Size 31 x 12

International—Type RES

Spo—Model 506

Herman—10,000 lb.—144" table

Tabor—30" Shockless type

Osborn—#601, 602, and 605

Osborn—#2047-4, Power

SANDMIXERS

Beardsley & Piper—#50

Simpson—#2

MISCELLANEOUS

Climax Wire Straightener—#2

Beardsley & Piper Screenerators—Model S

2000 lb. Fisher & Strohman Tilting Melting Furnaces

Dielectric Core Ovens

FOR THE BEST DEAL CALL

BALCHER MACHINERY COMPANY

6020 EUCLID AVENUE

CLEVELAND 3, OHIO

TELEPHONE: EXPRESS 1-8930

FOR SALE OR RENT

EQUIPMENT IN EXCESS OF OUR IMMEDIATE REQUIREMENT:

(2) Lima Shovels Model 2400, 6 yd. capacity. Cat. V12 with super charge and Torque Convertor. Location, Minnesota.

(1) 1201 Lima 3½ yd. Shovel. Latest model and latest equipped. A-1 condition and ready to go to work. Location, Minnesota.

(1) Lima 802 — 2yd., Torque Convertor, shovel front, 24'6" boom, dipper stick —18'. Location, Minnesota.

(1) Lima 603 with shovel front. Approximately $2000.00 worth of spare parts. Diesel power. Location, Iowa.

(1) 603 Lima 60' boom, rudamatic tagline, and fairleads. Cat. Diesel Engine. Machine in excellent condition. Location, Iowa.

(1) Lima 34 Paymaster. Combination Pull Shovel and Crane Boom. GMC 671 diesel power. Location, Minnesota.

(1) Marion 2½ yd. Shovel with Buda Diesel. Approximately $6000.00 worth of spare parts. Location, Minnesota.

(1) 2 yd. Marrion all electric Shovel. Location, Minnesota.

(1) Marion all electric combination shovel and Crane. Location, Mich.

(2) 40 ton Locomotive Cranes. Location, Minnesota.

(1) 20 ton Industrial Locomotive Crane. Location, Minnesota.

(1) Bucyrus Erie 44B combination Shovel and crane. Good condition. Location, Minnesota.

(1) 37B Bucyrus Erie 1½ yd. Machine has new D13000 Cat. engine. Location, Minnesota.

(1) P&H Model 700 combination Shovel and Crane. GM power. Excellent condition. Location, Minnesota.

(1) P&H Model 955 with shovel front. D17000 power. Location, Ill.

(1) 80D Northwest 2½ yd. Shovel. New in 1952. Location, Minnesota.

(2) 104 Northwests, 1¼ yd. 50' booms. Good condition. Location, Iowa.

(7) 1¼ yd. Northwest Cranes. 50 to 65' booms, high Gantry. Long wide crawlers. Good engines. Some have fairleads for dragline work. Location, Illinois.

(1) 1¼ yd. Northwest Crane. 50' boom. Fairleads with 1 yd. Clam shell Bucket. Rudamatic tagline. Location, Iowa.

(2) 1¼ yd. Northwest Cranes, 55' booms. Engines rebuilt in 1955. Location, Wisconsin.

(1) 1¼ yd. Northwest with 55' crane boom and shovel front combination. Location, Michigan.

(1) 1¼ yd. Northwest, combination shovel and 50' crane boom, fairleads. Location, Michigan.

(1) 1¼ yd. Northwest, 65' crane boom, high gantry, extra long crawlers. Location, Michigan.

(1) 1¼ yd. Northwest, 45' crane boom, fairleads, lights. Lacation, Michigan.

(1) No. 6 Northwest; long, wide crawlers, 65' boom, high gantry. Location, Wisconsin.

(1) Model 25 Northwest, shovel and crane combination, new in 1953. Location, Wisconsin.

(1) Unit ¾ yd. with shovel front. Was new in 1948. Overhauled and rebuilt in 1955. Location, Wisconsin.

We carry one of the largest spare parts stock for Model 104 Northwests in the country.

(15) 1½ yd. Clamshell Buckets. (2) 2 yd. Clamshell Buckets.

(2) Austin Westerns, combination shovels and cranes. Rebuilt and working every day.

(1) 4 yd. Koehring, Tilt Mixer. New.

EUCLID AND MACK TRUCKS

(8) 30 ton Mack end dumps. Model F-C-S-W. Serial No's. 1244-47-52-53-55-56-59-60. With approximately 50 tons of spare parts. Location, Minnesota.

(38) Euclid, Mack, and Darts. All end dumps, from 12 to 34 ton. Late model trucks. All above trucks are painted, cleaned, overhauled and ready to go into operation.

(6) 59TD, 22 tonners. Serial No's. 14913-15723-24-25-27-28.

(10) No. STD, 22 tonners. Serial No's. 6581-82-84-89-72-96-97-90. Have N-H-R-S Cummings engines and heated boxes.

BLAST HOLE DRILLS

(1) 27T Bucyrus Erie Blast Hole Drill complete with tools.

(1) 22T Bucyrus Erie Blast Hole Drill complete with tools.

(5) 29T Bucyrus Erie Blast Hole Drills complete with tools.

(2) Core Drills complete with tools. All the above drills are located in Minnesota.

TRACTORS, SCRAPERS, AND GRADERS

(1) TD24 International with dozer and PCU.

(2) TD24 Internationals with PCU and Pusher Plates.

(1) D8 Cat. and 12 yd. Scraper. Also Bulldozer. Manganese tracks. Machine rebuilt in 1955.

(1) D8 Cat. with Cat. 80 Scraper. New in 1954.

(2) Tourneau Dozers with 671 GM engines.

(1) Root Rigger.

(2) Galion. Model 118, Motor Patrol. New in 1953.

The above machines are located in Minnesota.

TRUCKS AND TRAILERS

(1) 20 ton 6 by 6 Reo Tractor with front winch. Mileage—6000.

(2) White W-22.

(1) Model W-26 with dump body.

(3) F8 Ford 1952 tandems. 14' light weight dump bodies.

(8) LF 195 International tandem Tractors. 450 engines. Large Henderson dollies.

(8) 5 ton 4 wheel drive Federals with 510 Hercules engines and 5th wheel. 920 rubber.

(1) Auto Car with single axle Gram Trailer. Semi dump.

(1) New 50 ton Low Boy Trailer. Legal width.

(1) Heavy duty Low Boy with tandem diesel Tractor.

(1) TD14 with 2 yd. Drott Loader. New condition.

(9) Tandem axle Semi Dump Trailers. Cable lift.

(4) Single axle Semi Dumps.

CRUSHERS

(1) 2036 Universal Jaw Crusher.

(1) 25 by 40 Roller Bearing Jaw Crusher.

(1) Cedarapids Pitmaster Portable Crushing Plant. New in 1954.

The above equipment is located in our Wisconsin, Michigan, Indiana, Illinois, Minnesota, and Iowa plants.

TERMS TO RESPONSIBLE PARTIES

FOR FURTHER INFORMATION OR INSPECTION CALL THE Lyle T. Manley Co., Manley Bros. Inc. at any of the following offices. Home office: Rockton, Ill., phone 2-4221—2-5581—2-8511. St. Paul, Minn. office: The Pioneer Bldg., phone Capitol 4-7010. Gary, Indiana office: 1050 Ogden Dunes, phone Ogden Dunes 2925 or 3820. Ed Heaton Foundry Division, St. Paul, Minn., phone DeSoto 5631. Kenosha, Wis. office: 7824 Pershing Blvd., phone Olympic 2-1743.

LYLE T. MANLEY CO.

Guaranteed Foundry Equipment for Sale!

CONVEYORS:

24″ flat belting
18″ troughing belt
bucket sand handling
Steel Apron
Sorting—steel plates

SAND MULLERS:

2—#3 Simpson—unit drives
2—#3 Simpson—Type C
1—#3 Simpson—Type H
1—#2 Simpson—Type H
1—#70 Beardsley-Piper
1—#30 Beardsley-Piper

CUPOLAS:

2—#11 Whiting complete with skip bucket loaders.
1—#5 Whiting complete
1—#3½ Modern complete

CORE OVENS:

2—Coleman 2-compartment Recirculating, gas fired with all controls, 6′ x 7′ door openings 17′ 11″ overhead clearance required overall 14′ 7″ wide x 17′ 4″ deep.

MOLD CONVEYORS: (Merry-Go-Round)

109 cars 32″ x 39″ plain top, heavy duty Manufacturer — Webb Company one extra drive.

35 cars 38″ x 72″ Roller type Link-Belt 27′ x 70′6″ centers.

AIR COMPRESSORS:

150 H.P. 800 CFM Ingersoll-Rand two stage horizontal complete with air receiving tank, 220/3/60.

40 H.P. 200 CFM Ingersoll-Rand single stage, complete with air receiving tank, 220/3/60.

CRANES:

1—3 ton Bedford Overhead Bridge Crane 3 motors 220/440/3/60, 40′ span 120 ft. runway.

1—3 ton floor operated 220/3/60 22′ 4″ span

BLAST CABINET:

1—large American Wheelabrator cleaning cabinet equipped with monorail, for automatic cleaning and abrasive reclaiming. motors 220/440/3/60. All controls.

Miscellaneous Foundry Equipment

Air Hoists
Core Blowers
Exhausters
Furnaces:
- Non ferrous
- Annealing
- Heat treat

Grinders:
- Horizontal disc
- vertical disc
- double end stand
- swing

Ladles:
- Industrial
- Modern
- Timken
- Whiting

Molding Machines:
- Jolt Squeezers
- Jolt Strippers
- Jolt Rollovers
- Jolt Squeeze Strip
- Pushoff

Scales
Sawtables
Sand Slingers
Shake-outs
Sand Mullers
Sand Conditioners
Magnesium Cleaning cabinets
Tumbling mills

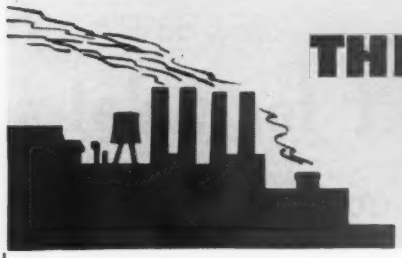
Flasks:
- Hines Popoff
- Steel

Truck—Ford Dump

We buy and sell complete foundries.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD **TELEPHONE: GLENVILLE 1-1222** **CLEVELAND 10, OHIO**



THE ACME bargain page

AIR COMPRESSORS

Ingersoll-Rand Type 10-14 x 9 x 12, 2 stage, 75 HP, 3/60/220/1200 rpm Synchronous motor, 350 CFM at 100#.

5 x 5 Ingersoll-Rand 10 HP motor.

Ingersoll-Rand Type 10, 800 CFM, XRB2, 16″ stroke 20″ x 12½″ cylinder, 2 stage compressor, 206 HP, 220 volt motor, with starter and air receiver. Complete. This unit was rebuilt in 1952 by Earl Knox Co.

Ingersoll-Rand Type 10, 800 CFM, 2 stage air compressor, 200 HP, 220 V motor. This is an older unit. No starter or air receiver. Overhauled in 1951.

Sullivan Vertical Single Stage 100 HP air compressor, 220 volt motor, with starter and air receiver.

Chicago Pneumatic 2 stage Horizontal tandem duplex 24″ x 14″ x 18″, 4 cylinder 3600 CFM 800 HP synchronous motor 2200 V exciter starting panel MG Set. Intercooler after cooler.

Ingersoll-Rand XB Imperial 2. Stage 22 and 13 x 16, 220 HP 220 V.

Ingersoll-Rand Imperial Type 10. 2 stage 800 CFM 18″ and 11″ x 16″, 170 HP, 220 V motor.

Chicago Pneumatic 50 HP direct motor driven Type P-4.

BLOWERS

Spencer Turbo Blower, 2250 CFM at 16 oz., 15 HP 3/60/220 totally enclosed motor. New 1947.

Ingersoll-Rand Motor Blower Type FS. Single Stage 4000 CFM @ 3.75 PSI, 100 HP, 220 V. G.E. Induction Motor.

Buffalo 7E Direct Connected Blower, 50 HP Westinghouse motor, 3/60/220-440 V, 3535 rpm, 28″ wheel, 3500-4000 CFM at 32 oz. Flanged outlet.

General Electric 7500 CFM, 20 oz., 89.6 Max HP, 220 V motor, Airway controls.

Ingersoll-Rand turbo compressor 10500 CFM @ 20 oz. 85 HP G.E. 220 V 3500 CFM motor.

CLEANING EQUIPMENT

Sly 8′ Dia. Table Shot Blast Unit.

Wheelabrator 27″ x 36″ rubber belt.

36 x 42 Halloway 7½ HP shot motor elevator and dust collector.

CONVERTOR

100 KW Rotary Westinghouse 220 V 60 cycle primary 250 V DC, complete with controller and panel.

CORE BLOWERS

3 International SB 12.
4 International SB 13.
1 International SB 15.
2 Osborn 93.
2 Osborn 193.
1 Osborn 2035-2.
1 Peterson (Similar to Demmler #50).

Osborn 5 Station Rotocore Automatic Core Blower. New 1952.

CORE OVENS VERTICAL HORIZONTAL

2—Coleman, combination oil or gas fired 43 carriers 24″ x 90″—1 hour 12 min. to 4 hours 48 min. cycle.
1—Coleman, Combination oil or gas fired 43—2 shelf carriers 30″ x 144″ long. 2 hour 12 min. to 7 hour 24 min. cycle. Present replacement cost over $90,000.

CORE PLATES

50 Tons Moltrup Steel Plates Sizes 4″ x 11″ to 11″ x 40″ and 22″ x 26″. Many still in original factory crates.

CORE ROD STRAIGHTENERS

2—Older type #2 Climax, $100.00 each.
1—Climax #3A. ¼″ to ¾″ capacity.
1—DX5 Kane & Roach ⅛″ to ⅜″ capacity.

CORE DRAWS

2—SPO CD. Core Draw Machines.
13—Ferro Core Draws rollout tables.

CRANES

10 Ton Shaw Box Floor controlled 20′ span, hand travel bridge.

P & H girder 18″ span traveling crane, 2-2½ ton single hook cranes with single cab.

DUST COLLECTORS

Whiting Dust Suppressor, bag type, 12,000 CFM, 30 HP motor to handle hot fumes from electric furnace hood. New 1953. Cost us over $14,000 before erection and without wiring or duct work.

Rotoclone 16 W arrangement C Dynamic Precipitator, Wet type chain, sludge ejector, 30 HP motor.

GRINDERS, DISC

Besley 208 Double End 26″ x 2⅜″ wheel with 2 compound tables, V belt drive. 15 HP, 220-440 totally enclosed motor magnetic starter controls.
2—U.S. Model 80 Double End 2-18″ dia. wheels, 7½ HP motor, 2 swinging tables 8″ x 14″—1 with hand lever feed.

FLASK OR FLAT GRINDER

Gardner #179—72″ dia. horizontal disc complete 40 HP motor and #8 Rotoclone dust collector.

GRINDERS, SNAGGING

3″ x 24″ US #65, 20 HP 220/440 V.
3″ x 24″ Hammond 20 HP 220/440 V.
2″ x 24″ McCabe 440 V.
30″ Kling Heavy Duty 15 HP, 220 V.
18″ Kling Heavy Duty 220 V.
2″ x 14″ Marschke 440 V.

GRINDERS, SWING FRAME

2—3″ x 24″ x 12″ Fox #4, 15 HP.
1—3″ x 24″ x 12″ Marschke 20 HP.
1—3″ x 24″ x 12″ U.S. 15 HP.

LADLES, GEARED CRANE

2—5000# Modern lip pour.
1—8000# Modern lip pour.
1—10,000# Whiting inside teapot.
1—Modern 28 x 26 Cylindrical.

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ACME EQUIPMENT CO., INC.

We will buy for cash a single piece of equipment or your entire foundry

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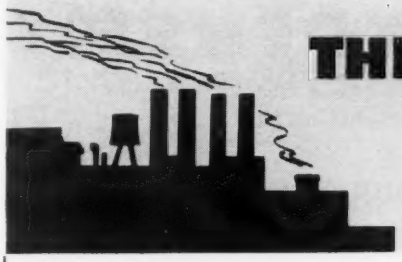

THE ACME bargain page

MOLDING MACHINES

Jolt Squeezers:

2—Milwaukee 131B Jolt Squeezers, Column type stationary 21″ x 30″ table.
3—International PJS-13″ Cylinder column type 18″ x 28″ table stationary.

Jolt Squeeze Pin Lifts BIG ONES

1—Osborn 724PJ 38″ x 56″ table, 24″ squeeze cylinder 11″ jolt cylinder 10″ draw.
3—International PK 20's, 20″ squeeze cylinder 8″ draw. Serial 67237. New 1949.
1—Osborn 712 PJ. Stationary Jolt Squeeze pin lift 18″ x 28″ table 12″ squeeze cylinder, 6″ draw.
2—Milwaukee Jolt Squeeze strippers, Model 163-50, 15″ x 24″ table 16″ X open end pattern size.
1—SPO 214 Jolt Squeeze Pin Lift.

ROLLOVERS Jolt Rollover Pattern Draw

1—Herman 4000# Series 30″ x 60″ table 32″ x 48″ bumper.
1—Herman 3000# Series 40″ x 84″ table, special slotted table.
1—Herman 1500# Series 20″ x 36″ table.
2—Herman 750# Series 20″ x 30″ table.
2—Herman 750# Series 20″ x 24″ table.
All the above have air clamps rollout tables.
3—Davenport Jolt Rollovers, portables.
1—Tabor 1000# 30″ x 60″ table.
1—Osborn 405—40″ x 70″ table 2000# capacity.

Jolt Pin Lifts

Johnston & Jennings 1015, 30″ x 38″ table.

Pin Lift Pushoffs

2—Champion Pin Pushoffs 28″ x 42″ table 10″ draw.

CASTINGS CONVEYORS OR COOLING TOWER

4580—Jervis B. Webb 678 chain 6″ rail 1560 trolleys 4-DC speed reducer and motor generator set 3 speed recorders, 400 casting boxes and V shaped baskets large quantity turns takeups, etc. This has been used as a single unit but will divide 75 tons structural steel outdoor tower. 125′ long 20′ wide 45′ high open steel frame with roof.

MULLERS AND MIXERS

B & P #70 with dust hood and bucket 100 HP 220/440 V motor, starting compensator.
Simpson #3 Motor on base.
Simpson #3 Type H open gear type.
Simpson #3 Open Gear Type $1000.00.
Simpson #3 Muller with bucket loader.
American Model M Sand Cutter 70″ blades.

OVENS, MOLD OR CORE

Porbeck Double Car Single door 16′ long 14′ wide 9′ high, gas fired 600° recirculating complete with 7½ HP car puller, in place St. Louis, Mo.
Core Oven Electric 68″ x 42″ High, 65″ deep 100°-650°.

HOT METAL CARRIER SYSTEM

9—Cleveland 1 ton ETH-DOC-1 Electric propelled carriers, open cab and 950′ Cleveland Arch beam rail. Current collectors switches, etc. will divide.
2—Cleveland 2000# DC Carriers Motor Driven open cab with 300′ Arch rail, current collectors switches, etc.

PREPARATOR

B & P #70 Preparator. Only used 3 months.

RIDDLES

Champion Sand Riddle, floor type.
Universal Sand Riddle.

ROTOBLAST

Pangborn table with 3-8″ rotating work tables, 3 position loading, cleaning and touch-up designed for work similar in size to aircraft cylinders. Like New condition.

SAND HANDLING EQUIPMENT

Blaw Knox Sand Grab Bucket for crane use.

PUG MILLS

2—Link Belt 1 single screw 15 HP motor, 1 double screw 35 HP models.

REVIVIFIERS

2—Link Belt B102—10 HP Reduction drives.

SAND HOPPERS

13′ x 11′ x 12′ High.
10′ x 13′ x 10′ High.

SCREEN

Simplicity 3 x 10 gyrating screen.

SHAKEOUTS

Link Belt 3 x 5.
Simplicity 4 x 6 Heavy Duty 15 HP motor.

SAWS

Crescent Band Saw, 30″ cap. w/3 HP 220-440 V. motor.

SAND SLINGER

B & P Stationary Slinger with bucket elevator to 10′ x 10′ x 6′ sand storage bin, conveyor feeder to double belt head 19″ head single speed.

SHOT BLAST MACHINES

2—American Hand Shot Blast Units, Size BM89400 Type K pass through roller conveyor for cylinder heads or similar castings.

SPEED REDUCERS

We have a large stock of speed reducers and geared head motors. Write us your needs.

ACME

ACME EQUIPMENT CO., INC.

We will buy for cash a single piece of equipment or your entire foundry

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INSPECT AT OUR EXPENSE!

Your travel expenses refunded if any machine in our warehouse is not as represented. Why don't you join the hundreds of foundries that are lowering costs and raising production with late type . . .

UNCONDITIONALLY GUARANTEED EQUIPMENT REBUILT BY UNIVERSAL

AIR COMPRESSORS

1—40 HP SULLIVAN, Model B-Bim #8, WL 60 w/Receiver.

BLOWERS

1—85 HP G.E. Cupola Blower, 24 oz.
3—7½ HP FISHER, 16 oz.
15—CENTRIFUGAL BLOWERS, 350 CFM to 10,500 CFM.

CLEANING EQUIPMENT

1—AMERICAN #1 MULTITABLE, 6 aux. tables 15", main table 45".
1—ROBBINS SHAKEOUT, 4' x 2'.
1—AMERICAN WHEELABRATOR 72" SWING TABLE with Elevator; installed 1953; used 2 months.
1—PANGBORN #3½ GK ROTOBLAST.
1—AMERICAN #2 MULTITABLE, 5 tables, 37" dia.
1—PARSONS Sand Blast Room, 7' x 7' x 12'.
2—SIMPLICITY SHAKEOUTS, 4' x 6'.
1—LINK BELT SHAKEOUT, 5' x 8', 5 HP Motor.
5—US GRINDERS, double end, 10, 15, 20 HP.
4—GRINDERS, Swing frame, 15 HP.
2—TUMBLING BARRELS, Cast Iron, 36" x 24" w/2 HP Motor.
2—TUMBLING BARRELS, Square, 34" x 48".
2—TUMBLING BARRELS, Side Tilt, 18" wide x 20" deep.
3—TABOR CUT-OFF Saws, 5 & 10 HP.

CONVEYORS

4—SAND ELEVATORS, various sizes.
1—STEEL PLATE MOLD, 90' centers, 30" belt, w/drive.
2—STEEL PLATE MOLD, 90' centers, 24" belt, w/drive.
6—SAND BELT CONVEYORS, 10' centers to 140' centers, 18" to 36" belt, complete w/drives and hoppers.
2—CASTING CONVEYORS, wire mesh, 18" x 32" w/drive.
FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES—SEND REQUIREMENTS

CUPOLAS

1—WHITING, #4, with skip charger motor and blower.
1—WHITING # 6, Complete.
1—WHITING #7.
1—MORRIS #9, w/skip, mixing ladle, never used.
1—WHITING #3½, w/Blower & Air weight Control.
1—WHITING #5, w/Blower & Air weight Control.
1—MODERN, #3, 46' shell, w/blower.
1—SKIP CHARGER, 3 bottom drop buckets, blower, motor, and scale for #9 Cupola.

CORE BLOWERS

1—CB-400 CHAMPION. 1—3K DEMMLER.
1—#55 DEMMLER. 1—#92 OSBORN.
1—FEDERAL, San-Blo.
1—SB 13 INTL.

FLASKS & CORE PLATES

400 TONS, CAST STEEL, STRUCTURAL STEEL and STERLING TYPE FLOOR FLASKS—ALL SIZES.

20 TONS, FLAT STEEL and PERFORATED STEEL CORE PLATES.
SEND FOR COMPLETE LISTINGS.

FURNACES—DIRECT ARC MELTING

1—150#/hr. "LECTROMELT".
1—250#/hr. Hydraulic Top Charge.
1—500#/hr. HEROULT.
1—1 Ton WHITING Top charge.
1—2 Ton SWINDELL, Top charge.
1—1000# SWINDELL.
1—2 Ton WHITING top charge.
2—3000# HEROULTS.
1—2 Ton HEROULT.
1—6 Ton HEROULT.
Several 3 Ton to 10 Ton capacity Side and Top Charge Furnaces.

FURNACES—DETROIT "ROCKING"

2—200# cap. DETROIT, complete.
3—350# cap. DETROIT, complete.
1—1000# cap. DETROIT, complete.
1—3000# cap. DETROIT, less transformer.
1—1500# DETROIT, Complete.
1—60# DETROIT, Complete.

FURNACES—INDUCTION MELTING

1—20 KW AJAX Spark Gap High Frequency, 17 lb. capacity in steel.
1—25 KW AJAX HIGH FREQUENCY M. G. SET with CONTROLS, 50# CAP.
2—60 KW, AJAX-TAMA-WYATT, Alum.
1—80 KW, GE, 9600 Cy., MG Set.
3—333 KW, AJAX-TAMA-WYATT, 1500# Alum.
1—175 KW, 960 CY., MG Set, 1000# Cruc.
1—166 KW, AJAX, 60 Cy., Alum.

FURNACES—OIL AND GAS

1—HAUSFELD Tilting #675, 250 cruc. Oil.
1—FISHER 4 Burner MNP, 1700#, gas.
3—WALKER YORK #400 cruc. tilting, coke fired.
1—SKLENAR 600#, Oil fired.
7—HAUSFELD 1000#, tilting, oil fired.
1—HAUSFELD Tilting, 1200# Mag.
3—MONARCH Oil Fired Stat., #60 cruc.

LADLES & POURING DEVICES

2—6 TON TEAPOT, Worm Geared.
2—WHITING 3 Ton, Bottom pour.
3—MODERN #F-9 POURING DEVICES.
4—10 TON BOTTOM POUR, 55" x 55".
2—15 TON BOTTOM POUR, 65" x 59".
2—45 TON TREADWELL, Excellent.
1—20 Ton lip Pour, 72" x 72".
1—SWINDELL, Elec. Holding.

MOLDING MACHINES

2—HERMAN ROLLOVERS, 26 x 30", 750#.
1—HERMAN ROLLOVER, 1500#.
1—DAVENPORT 40-AJS Jolt Stripper.
1—SPO Port, Jolt Rollover, #506-1.
8—OSBORN #275J Jolt Squeezers.
2—SPO #110J Jolt Squeezers.
5—MILWAUKEE Jolt Pin Lift 32" x 38".
2—MILWAUKEE Jolt Squeeze Strippers, #163.
1—J & J #612 Port. Rollover, 24" x 30".
1—J & J #815-B Rollover.
3—INTERNATIONAL "G", 24" x 10" Jolt Rollovers.
5—OSBORN Jolt Rollovers, Hand Draw, #142.
3—TABOR Jolt Squeeze in Head.
1—OSBORN #243 Jolt Rollover.
1—OSBORN #559 Jolt Stripper, 25" x 30".
1—DAVENPORT 28SA, 28" x 40".
3—HERMAN Rollover & Jar, 6000#, 60" x 80".
2—HERMAN JOLT ROLLOVERS, 3000#.
11—DAVENPORT #30-T Jolt Strippers.
2—TABOR POWER ROLLOVERS, #2242 w/clamps, late.
1—TABOR Jolt Stripper, 20" x 20", 4" draw.
2—TABOR ROLLOVERS, 30" x 40".
1—SPO, 9336, Jolt Clamp rollover draw.

MULLERS AND MIXERS

1—B. & P. Porto-Muller.
2—SIMPSON #3, enclosed gears.
2—SIMPSON #2, Unit Drive.
2—CLEARFIELD #610 and #920.
1—BEARDSLEY & PIPER #60 SPEED-MULLER, 60 HP motor, SKIP-LOADER.
1—B & P Speedmuller, #40.

OVENS

2—FOUNDRY EQUIPMENT, 2 compartment 5' wide x 6' high x 10' deep, Oil Fired, Recirculating, Walk-in.
1—FOUNDRY EQUIPMENT, Oil Fired, 4 drawers.
2—ROSS 2 comp., rack, gas, 6½" x 14" x 7".
1—CRAWFORD, Gas Fired, 3 drawers.
1—HOTPOINT EDISON, ELECTRIC, 6 drawers, 30" x 40" x 8".
1—CORE OVEN, 82" high x 6' deep x 12' wide, 2 sets of drawers, gas or oil.
1—YOUNG BROS. 3 compartment, kiln type baking oven, electrically heated, with CONTROLS.

SAND CUTTERS

5—AMERICAN SAND CUTTERS—
1—MODEL "AA", 60" reel, Gas Driven.
1—MODEL "K", 72" reel, Gas Driven.
1—MODEL "F", 80" reel, Gas Driven.
1—MODEL "D", 76" x 96".
1—SANDMASTER, 70/102, New in 1950, Rubber Tires.

SAND LABORATORY EQUIPMENT

1—TEST CORE BAKING OVEN #606.

SAND PREPARATORS

1—REDDY SAND UNIT, HANDY SANDY.
2—JEFFREY SANDITIONERS, Portable.
1—SCREENERATOR "M".
2—ROYER SAND BLENDERS, 16" belt, 12" belt.
1—LINK BELT REVIVIFIER, Size 5.
2—B & P SAND CONDITIONERS, portable.
1—HETHERINGTON & BERNER SAND DRYER, rotary, oil fired, #552.

SAND SLINGERS

1—BEARDSLEY & PIPER MOTIVE JR. 19" head.
1—BEARDSLEY & PIPER TRACTOR TYPE 16" head, magnetic separator.
1—PORTABLE SLINGER, 16" head, 4' long, on Truck.

TESTING MACHINES

1—TINIUS OLSEN, UNIVERSAL, 100,000# capacity.
1—TINIUS OLSEN, BRINELL HARDNESS, 3,000 KG.
1—RIEHLE, UNIVERSAL, 2 screw mechanical, 100,000# capacity.
1—RIEHLE, BRINELL HARDNESS, hydraulic, 3,000 KG.
1—ROCKWELL HARDNESS, #5JR with "C" Brail.
1—BALDWIN - TATE - EMERY, UNIVERSAL, Hydraulic tensile, 24,000#.

TRUCKS

1—CLARK, FORK LIFT, 108" lift, Gas.
2—HOUGH PAYLOADERS, Model HA, Hydraulic Trip.
Outside Yard Crane Runway, 2-5 Ton Cranes, 50' span, 400' long.

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1—**BURY** Class URB, size 8 x 8, single stage horizontal, 180 CFM, w/30 HP
1—**CHICAGO-PNEUMATIC** Size 8 x 8, single stage Horizontal, 180 CFM w/30 HP motor.

AIR & ELECTRIC HOISTS

22—**INGERSOLL-RAND** Air Hoists, 700 lbs capacity through 10,000 lbs, all sizes and models, latest type, with trolleys or hooks for hanging.
1—**COMET** 1000 lbs capacity, electric 220V.
1—**DETROIT** 5 ton cap. Model LHR.
1—**ELECTRO-LIFT** 3000 lbs cap. 4 HP
1—**SHAW-BOX** Load Lifter Jr. 1000 lbs

BUCKET ELEVATOR

1—**LINK-BELT** 43' Length, 13" width belting, buckets 12" x 8" x 6" deep.

CORE BLOWERS

1—#1 **DEMMLER.**
2—**CB-400 CHAMPIONS.**
2—#91 **OSBORN.**
2—#193 **OSBORN.**
1—#192 **OSBORN.**
1—**OSBORN** #193.
6—**MILWAUKEE** — Taccone Model A-3, Bench Type.

CUT-OFF SAWS & STRAIGHTENERS

1—**TESSMER** Model H Sprue Cutters.
1—**OLIMAX** #2A Wire Straightener.
1—**AMERICAN** Type D Rod Straightener & Shear, ¾" shear, 1¼" straightener.

CONVEYORS—ROLLER-BELT—TROUGH

1—**FARQUHAR** 18" x 35' portable Trough.
1—**FARQUHAR** 18" x 19' Car Unloader.
5000'—**MATHEWS** Gravity Roller Conveyor, 10"—16"—18"—24" width rollers, standard & heavy duty, FOUNDRY TYPE.
190'—**LOUDEN** Mono-Rail—4—20' bridges.
1—**LINK-BELT** Overhead Conveyor, 100' track, chain, trolleys, curved, motorized.
1—18" x 48' inclined trough, with idlers, belting, pulleys, motorized.

CUPOLA & FURNACES BLOWERS

1—**INGERSOLL-RAND** Centrifugal Type FS-367 with 100 HP motor.
7—Furnace Blowers 1-3-5-7½ HP, 16 oz.

HEAT TREAT & ELECTRIC FURNACES

1—**LINDBERG** Model 4860GH, Cyclone Type Gas fired, with all controls.
3—**DETROIT** Type AA Rocking 1500 to 2000 lbs. w/400 KVA Transformers.
2—**DETROIT** Type AA Rocking 750 to 1000 lbs, w/250 KVA Transformers.

GAS & OIL FIRED FURNACES

3—**LINDBERG-FISCHER MNP** Size 2400 lbs gas or oil fired, motorized, complete.
1—**LINDBERG-FISCHER MNP** Size 225 lbs, gas or oil, w/motor-blower etc.
2—**LINDBERG-FISHER** Type BBI, 400 lb crucible type, hand tilt, gas or oil.
1—**STROMAN** Model U, 600 lbs Reverberatory, tilting, gas or oil fired.
2—**STANDARD** #30 & #150 Crucible, Stationary, gas or oil, w/motor-blower.
1—**HAUSFELD** #200 Crucible, stationary, gas fired, NEW 1952.
1—**STROMAN** Model NP, 125-175 Crucible, Mechanical Tilt, gas fired, with motor & blower & electrical tilt mechanism, NEW in 1945.
1—**LINDBERG-FISCHER** MNP Size 1200 gas or oil, motorized.
2—**CAMPBELL-HAUSFELD** 1000# motorized, tilting.

G. E. INDUSTRIAL X-RAY

Model KX 10, Type 1, 115 volts, 50/60 cycles, 13 amps. Serial 425456.

GRINDERS—SWING—SNAGGING—STAND

2—**FOX** #5 High Speed Stand, wheel 24" x 3"—10 HP motor.
1—**FOX** #7 High Speed Stand, wheel 30" x 3"—15 HP motor.
1—**HAMMOND WR-1** Double End Snag, wheel 24" x 3"—10 HP motor.
1—**QUEEN CITY** #100 Double End Disc.
1—**U. S.** Electric Swing Frame, 15 HP, 2 speed, wheel 24" x 3" x 12".
6—**U. S. ELECTRIC** #65 Snag Grinder, 15 & 20 HP models—4 speeds, max. wheel 30" x 4".
2—**U. S. ELECTRIC** Model 64 Snag Grinders, 7½ hp, adjustable speed, wheel 14" x 3".

LADLES & POURING DEVICES

6—**INDUSTRIAL** Lip Pour 24" x 24" rated 1600 lbs. enclosed Timken Gearing.
6—**MODERN** Model FA-9 Pouring Devices with ladles, trolleys & tilt devices.
2—**MODERN** Mixing Ladles, 40" x 60", on trunnions, geared, covered, lined.
4—**MODERN** 1500 lb. Cylindrical Type, 29" x 30", w/bails, covers & stands.
10—**WHITING** Models 1000 & 2000 Pouring Devices w/400 lb ladle, hand tilt.
3—**WHITING** 275# Cylindrical Type V-bail, 19" diam x 16" length, covered.

G. E. INDUCTION MOTOR GENERATOR SET

1—300 KW **G.E.** alternating current generator, 800 volt, 3600 RPM, 1 phase complete with 450 HP G.E. motor and control panel.

MOLDING MACHINES

1—**DAVENPORT** #28 RO Jolt Rollover & Pattern Draw 30" x 40" table, 12" draw.
2—**INTERNATIONAL RES** Jolt Squeeze Rollover Draw, Size 15" x 8" draw.
1—**INTERNATIONAL PKL** Jolt Squeeze Strip, 18" x 24" table, 6" draw.
2—**INTERNATIONAL G,** Jolt Rollover Foot Draw, 18" x 56" & 20" x 8" size draw.
1—**INTERNATIONAL LP-10** Jolt Pin Lift.
5—**OSBORN** #275J Jolt Squeezers, 10" cyl.
1—**INTERNATIONAL** Model JDP, Jolt Pin Lift, 10" draw, 1600 lb. capacity.
1—**MILWAUKEE** No. 125-3 Jolt Squeeze Pin Lift, table 21" x 27", 1200# jolt cap. 8" draw.
1—**DAVENPORT** #24SA Jolt Rollover & Pattern Draw, 24" x 38" Table, 12" Draw, 1000#.
2—**OSBORN** #710J Jolt Squeeze Pin Lift, 16" x 25" table, 6" draw, 10" squeeze
2—**OSBORN** #712PJ Jolt Squeeze Pin Lift, 18" x 28" table, 6" draw, 12" squeeze
1—**OSBORN** #342-1 Jolt Rock-Over Pattern Draw, 23" x 38" table, 10" draw, 1000#.
3—**OSBORN** #559 Jolt Strip, 25" x 30".
2—**OSBORN** #405 Jolt Rollover, table 57" x 64", 26" draw, 3000 lbs jolt w/rollout.
3—**OSBORN** #721 Jolt Squeeze Pin Lift, 22" x 26" table, 6" draw, 800 lbs. jolt.
4—**OSBORN** #210 PJ Jolt Squeeze 16" x 20" table.
5—**OSBORN** #601 Jolt Rollover Pattern Draw, 600 lbs jolt cap., 30" flask size, 10" draw.
6—**OSBORN** #602 Jolt Rollover Pattern Draw, 22" x 36" table, 10" draw, 750 lbs Jolt.
2—**OSBORN** #142 Jolt Rollover Hand Draw.
4—**OSBORN** #40 & #42 Hand Core Rollovers.
2—**HERMAN** Jolt Rollover Pattern Draw, 6000 series, 42" x 78" table, 6000 lbs.
2—**HERMAN** 40" x 60" Plain Jolt.
1—**JOHNSON & JENNINGS** #815 Jolt Rollover Pattern Draw, 30" x 40" table.
2—**TABOR** 22" x 42" Shockless Jar Rollovers.
2—**TABOR** 30" x 40" Shockless Jar Rollovers.
2—**SPO** #506 Jolt Rock-Over—24" x 25".
2—**SPO** #507 Jolt Rock-Over Pattern Draw, 32" x 40" table, draw 10 to 20".
1—**SPO** #508 Jolt Rock-Over Pattern Draw, 28" x 30" table, 9" draw, 1200# jolt.

SAND MULLERS

1—**BEARDSLEY & PIPER** #60 Speed Muller, 10 cu. ft. with 50 HP motor.
1—**BEARDSLEY & PIPER** #50, Speed Muller w/skip hoist, dust hood, 50 HP motor, etc.
1—**BEARDSLEY & PIPER** #30 Speed Muller.
1—**BESSER** 36" x 42" Blade Type Mixer, horizontal drum, 12 cu. ft., w/7½ HP.
2—1500# capacity Sand Larry, portable, w/Fairbanks Morse Dial.
3—**SIMPSON** #2 style UD—6' pan diam. 1500# batch, with skip loader, water meter, latest type.
5—**SIMPSON** #3 style C, separate drive enclosed gearing 8' pan diam, 3000# batch, w/motor & reducers.
1—**SIMPSON** #1H, 4' pan diam. unit drive, 500# batch size.
1—**SIMPSON** #1½, style UD, 4'6" pan 700# batch, w/skip hoist, water meter.
1—**BEARDSLEY & PIPER** #70 Speed Muller, 15 cu. ft batch size, w/100 HP.

SAND BLASTING EQUIPMENT

1—**HYDRO-BLAST** Type M, Wet Abrasive, 7'5" v 4'5" x 8', door opening, 40" x 28", w/tank, 40 HP motor etc.
1—**PANGBORN** #7GK-2 Rotoblast Barrel, 30" x 38" drum, 7 cu. ft. cap. airless type, w/skip hoist.
1—**AMERICAN WHEELABRATOR** 27" x 36" Tumblast steel belt, with shot return, skip hoist & all electrical.
1—**AMERICAN AIR FILTER** Hopper with Precleaner arrangement Type C, also with #14 Roto-Clone & sludge ejector.

SAND PREPARATORS

3—**B & P** Model M Screenerators.
1—**B & P** #70 Portable Preparator w/gyrating screen, aerator, magnetic separator, 90 cu. ft. hopper.
1—**AMERICAN** Model AM Cutter, size 69/45.
1—**AMERICAN** Model BD Cutter, size 75/60.
1—**ROYER** Model NDP, portable on steel wheels, 20 to 25 tons per hour cap.
1—**ROYER** "Jr" portable on steel wheels, 4 to 7 tons per hour cap.

SAND SLINGERS

1—**B & P** 19" Tractor Type, 13' arm.
1—**B & P** 16" Tractor Type, 13' arm, magnetic tower, 4' ramming 4" tip.

SHAKEOUTS & SCREENS

1—**ROYER** Combination Shakeout & Sand Conditioning unit, serial #ST-47.
4—**SIMPLICITY** 4' x 6' Model B, 5000#.
1—**SIMPLICITY** 4' x 10' Model D with Automatic Crusher, 15,000# load.
1—**STONEY** Core Knock-Out 8" x 20" head.
3—**SIMPLICITY** 3' x 6'—Model BG, 5000# safe load rating.

SAND RIDDLES

10—**UNIVERSAL** "Roto-Plane" Speed sifter, 20" diam, with 1/3 HP motor.
1—**COMBS** Type V Gyrating, 20" dia, 1/6 HP.

TUMBLING BARRELS

4—**SLY** 36" x 60" with 5 HP Gearhead motor—built in magnetic brake.
2—**SLY** 42" x 72" Square, with 10 HP Gearhead motor — built in magnetic brake.
1—**SLY** 42" x 66" Type C—10 HP motor.
1—**SLY** 24" x 36" with motor & drive.

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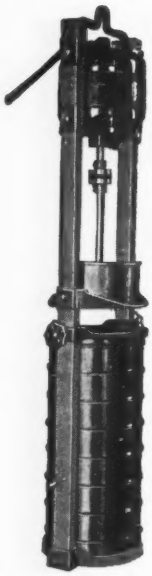

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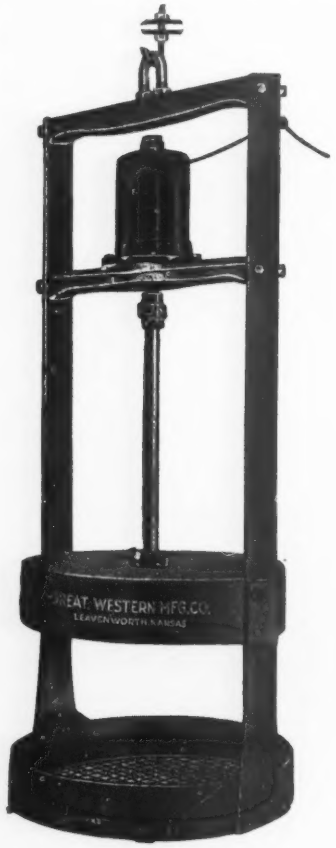

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"GATES AND RISERS FOR CASTINGS"

by Pat Dwyer, Engineering Editor, FOUNDRY magazine

- Recognized sourcebook of information on how to eliminate casting defects.
- Covers virtually all problems that arise in design and use of gates and risers for gray iron, steel, malleable, aluminum and brass-bronze castings.
- Simply written, easy to read text with detailed "how-to-do-it" drawings. This 3rd edition contains 31 chapters, 384 pages, 247 illustrations and is fully cross-indexed.
- Handy source of information which will pay for itself many times in the months and years ahead. Thousands of copies are already doing daily service in every type of foundry.

We invite you to examine "Gates and Risers" free for 10 days and decide for yourself how valuable it can be to you. At the end of that time, send us your check for $6.00, plus a few cents postage—or return the book without obligation. To get your copy just fill in and return the coupon below.

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Please send me a copy of "Gates and Risers for Castings" to examine FREE for 10 days.

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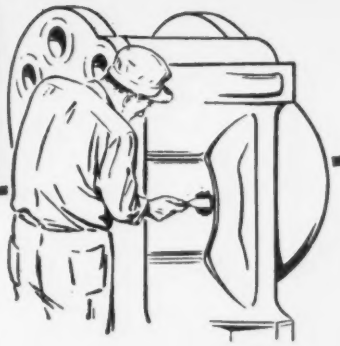

These features mean

BETTER LOOKING CASTINGS

TIGHT, LASTING REPAIRS

When correcting blow or sand holes, surface blemishes, or rough and porous areas in castings, you can depend on Smooth-On Foundry Cements, standard of the industry for more than 55 years. They are easy to apply, harden quickly, stay firmly in place.

FOUR DIFFERENT SHADES

With 4 different shades to pick from, you know you can get a close match for your castings.

4AA—Light gray, fine texture
4A —Medium gray, medium texture
4B —Dark gray, coarser texture also
9—Bronze or Brass

UNIFORM QUALITY

Rigid quality control means you can be sure that the strength and color of Smooth-On Foundry Cements will not vary from one order to the next. Every lot of Smooth-On cements is laboratory tested and must satisfy tests for setting time, hardness, and color before it is packed for shipment.

FREE SAMPLES

Why not try one or more of these Foundry Cements at our expense? We will be glad to send you a free sample of any of the cements described above if you will write us on your business letterhead. Write today, and see how Smooth-On can improve the appearance of your castings.

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570 Communipaw Ave., Jersey City 4, N. J.

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FOUNDRY CEMENTS

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LADLES ENGINEERED TO THE JOB

Pay off in three Big ways...

*Pouring 46,000 pounds of ductile iron in 2 min., 6 sec., from 78", MODERN, crane ladle.

1 *UNIFORMITY OF METAL CAST . . .
2 MORE PAY-TIME OVER THE MOLD . . .
3 REDUCED WASTE, LESS PIGGING . . .

Working closely with practical foundrymen, right out on the job for more than thirty years, has qualified MODERN engineers for designing the difficult, made-to-measure jobs.

*Today it may be receiving the iron direct from cupola at a spout height of 66" and pouring the 46,000 pounds into one mold from one ladle load as shown here. This huge casting was poured in 2 min., 6 seconds. The ladle of 78" top diameter and 65" deep is balanced for use with lining of 3½".

Tomorrow the requirement may be thin-wall brass and the necessary, split-second timing as required for a one-man, non-ferrous, pouring operation from a crucible.

Always regardless of the complexities MODERN ladles are designed to serve in their one-best-way. We'd like to plan with you, too. The savings you make on your engineered-to-the job ladles can be applied to your purchases of POURING DEVICES . . . MONORAIL SYSTEMS and FOUNDRY CRANES!

If your entire problem cannot be stated on the coupon put it on your letterhead, addressed to —

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MODERN EQUIPMENT COMPANY

MAIL TO MY ATTENTION:

Standard ladle catalog, 149 ☐
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Company .....
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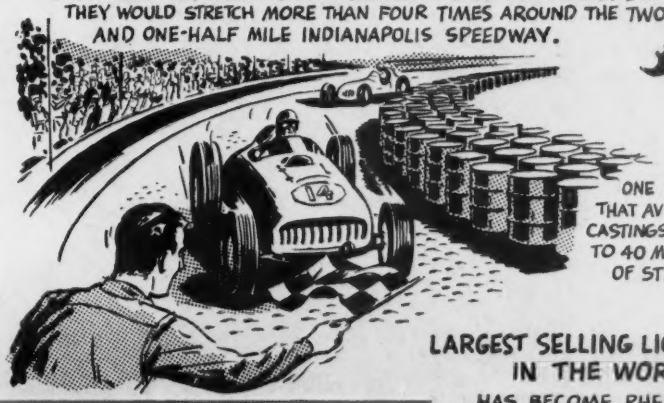
MODERN representatives in all parts of the world.

"Facing" Facts

FROM STEVENS FACING DEPARTMENT

FOUR TIMES AROUND THE INDIANAPOLIS SPEEDWAY

IF DRUMS OF STEVENS LIQUID PARTING THAT HAVE BEEN USED BY FOUNDRIES EVERYWHERE WERE PLACED SIDE-BY-SIDE THEY WOULD STRETCH MORE THAN FOUR TIMES AROUND THE TWO AND ONE-HALF MILE INDIANAPOLIS SPEEDWAY.



NO DUST FOR MOLDERS TO BREATHE

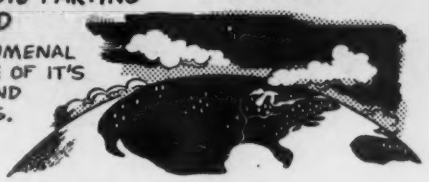
MOLDERS USING STEVENS LIQUID PARTING SAVE TIME IN DUSTING DRY PARTING ON EVERY MOLD. IT ELIMINATES THE DUSTY AIR AROUND MOLDERS... KEEPS BREATHING ZONE CLEAN AND FRESH.

GET 40 MOLDS FROM ONE APPLICATION

ONE LARGE MIDWEST FOUNDRY THAT AVERAGES 1,200 TONS OF CASTINGS PER MONTH REPORTS UP TO 40 MOLDS FROM ONE APPLICATION OF STEVENS LIQUID PARTING.

LARGEST SELLING LIQUID PARTING IN THE WORLD

HAS BECOME PHENOMENAL "BEST-SELLER" BECAUSE OF IT'S GREAT ECONOMY AND MANY VARIED USES.



FOR ECONOMY YOU CAN'T BEAT . . STEVENS LIQUID PARTING

In the Stevens files we have many testimonials from foundries which state they have made up to 60 molds from a single application of Stevens Liquid Parting. We have hundreds of reports of 25 to 50 molds for a single application. That's positive proof of its economy. And it is one of the important reasons why Stevens Liquid Parting is the largest selling liquid parting in the world today.

Consider these additional features: Patterns are left clean, with no adhering sand . . . Molds always give smooth castings because sand separates cleanly . . . Molders save time and increase production since, unlike dry partings, it is not necessary to shake parting on the pattern for each mold . . . It eliminates any need for heating patterns or plates . . . There is no parting dust in the molder's breathing zone.

If you have never tried this great foundry item be sure to make an early test in your own plant soon. Call your Stevens Sales Representative or write direct to Frederic B. Stevens, Inc., Detroit 16, Michigan.

WHAT USERS SAY:

WE TRIED MANY OTHER BRANDS

"After trying several other liquid partings, we tried the Stevens product and must admit its superiority to all others."

NO STICKING IN CORE BOXES

"Since using Stevens Liquid Parting there is no sticking in the core boxes, and they have taken on a 'burnished' appearance. Results are very satisfactory."

SOLVED OUR DIFFICULT CASTING JOB

"Stevens Liquid Parting enabled us to solve a difficult casting job of fins for an air cooled internal combustion engine."

COST IS NEGLIGIBLE

"The cost of Stevens Liquid Parting is negligible. On 625 tons of castings our parting costs were $60.00 or about 10c per ton of casting."

BRANCHES: **BUFFALO • CLEVELAND • INDIANAPOLIS • NEW HAVEN**

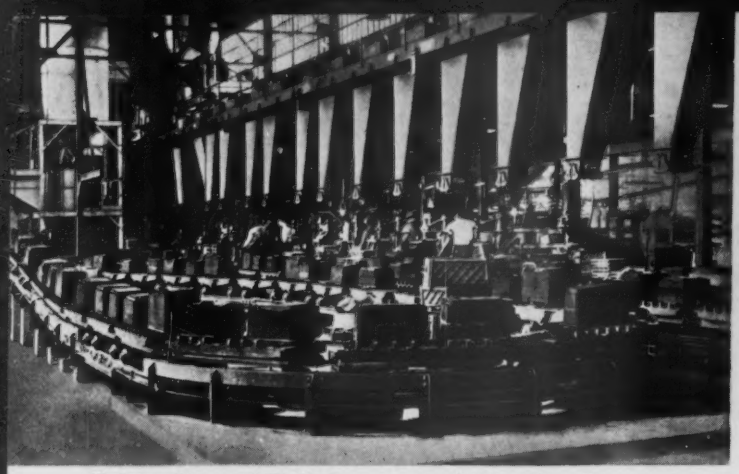
FOUNDRY FACINGS | GRINDING OPERATIONS | BLAST FINISHING | BARREL TUMBLING | METAL CLEANING | POLISHING & BUFFING | AUTOMATIC FINISHING | AUTOMATIC PLATING | METAL RECLAMATION

Metal Finishing equipment and supplies from castings or stampings to finished product

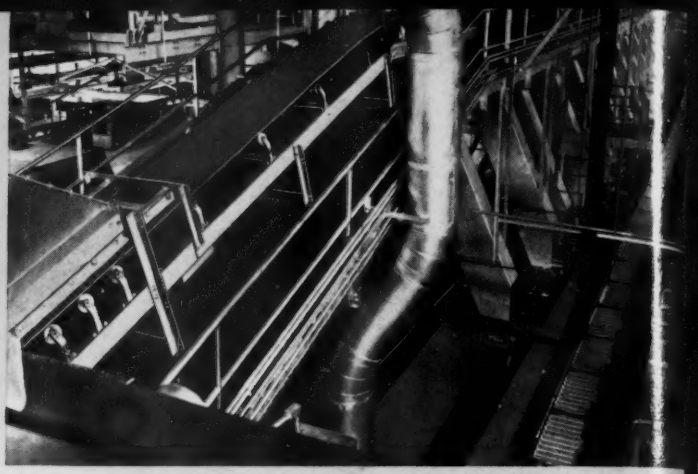
FREDERIC B. STEVENS INCORPORATED

EVERYTHING FOR A FOUNDRY

DETROIT 16, MICHIGAN



Molding Line and Mold Conveyor in Jobbing Foundry



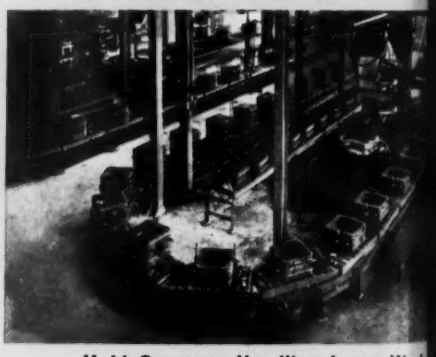
Prepared Sand Distributing Belt and Molders Hoppers

Complete Facilities

engineered, built and installed to meet your individual requirements

● Designed by foundry specialists who are familiar with the most advanced techniques in our fast changing industry, tailor made to meet your particular kind and type of work, Bartlett-Snow's complete sand, mold and castings handling systems *cut costs* and *increase output.* You fix definite responsibility for both *production* — and *performance* of your installation — by letting Bartlett-Snow engineers handle the entire project as a unit. We have been privileged to serve many of the country's best known and lowest cost foundries. May we help you too?

Core Sand Preparation System



Mold Conveyor Handling Large Work

DESIGNERS
ENGINEERS

BARTLETT-SNOW
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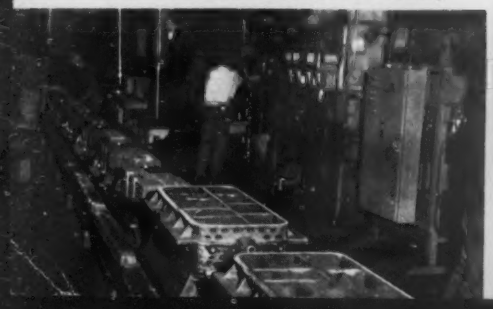
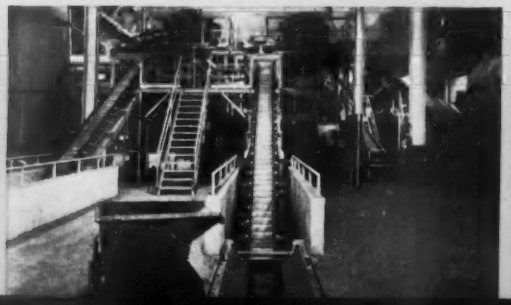
FABRICATORS
ERECTORS

Foundrymen Who Know — Buy Bartlett-Snow

Mold Conveyor in Large Automotive Foundry



Inclined Apron Conveyors Handling Small Castings



Sand Preparation System Showing Storage